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VOL. 62*.

RUDIMENTARY TREATISE
ON
RAILWAYS,
THEIR
CAPITAL AND DIVIDENDS,
WITH STATISTICS OF THEIR WORKING.
—
BY E. D. CHATTAWAY.

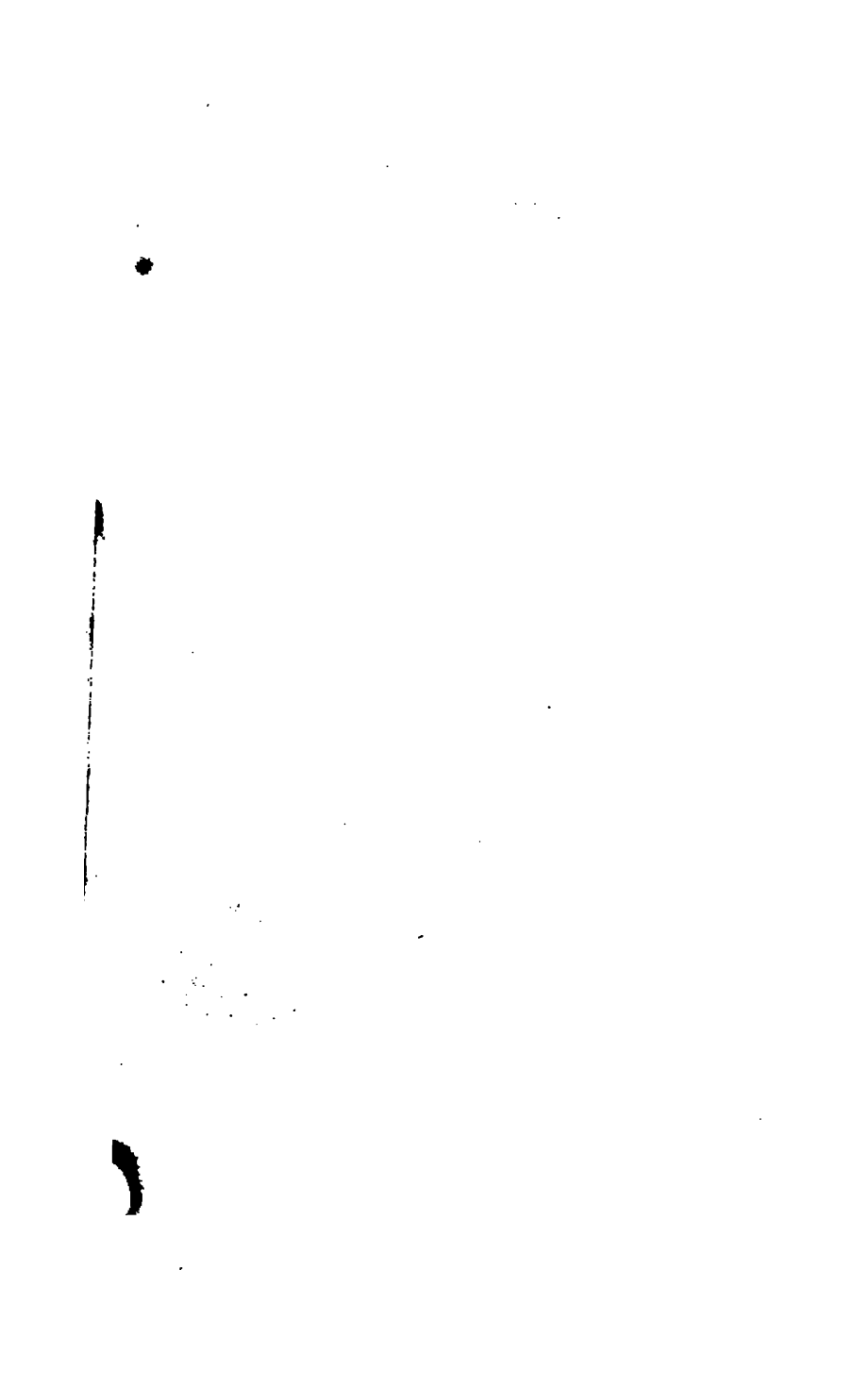
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RAILWAYS:
THEIR
CAPITAL AND DIVIDENDS,
WITH
STATISTICS OF THEIR WORKING
IN
GREAT BRITAIN,
&c., &c.

(BEING A SECOND VOLUME TO MR. STEPHENSON'S WORK ON RAILWAYS
IN THIS SERIES.)

BY
E. D. CHATTAWAY,
North British Railway.



LONDON:
JOHN WEALE, 59, HIGH HOLBORN.
1855-6.

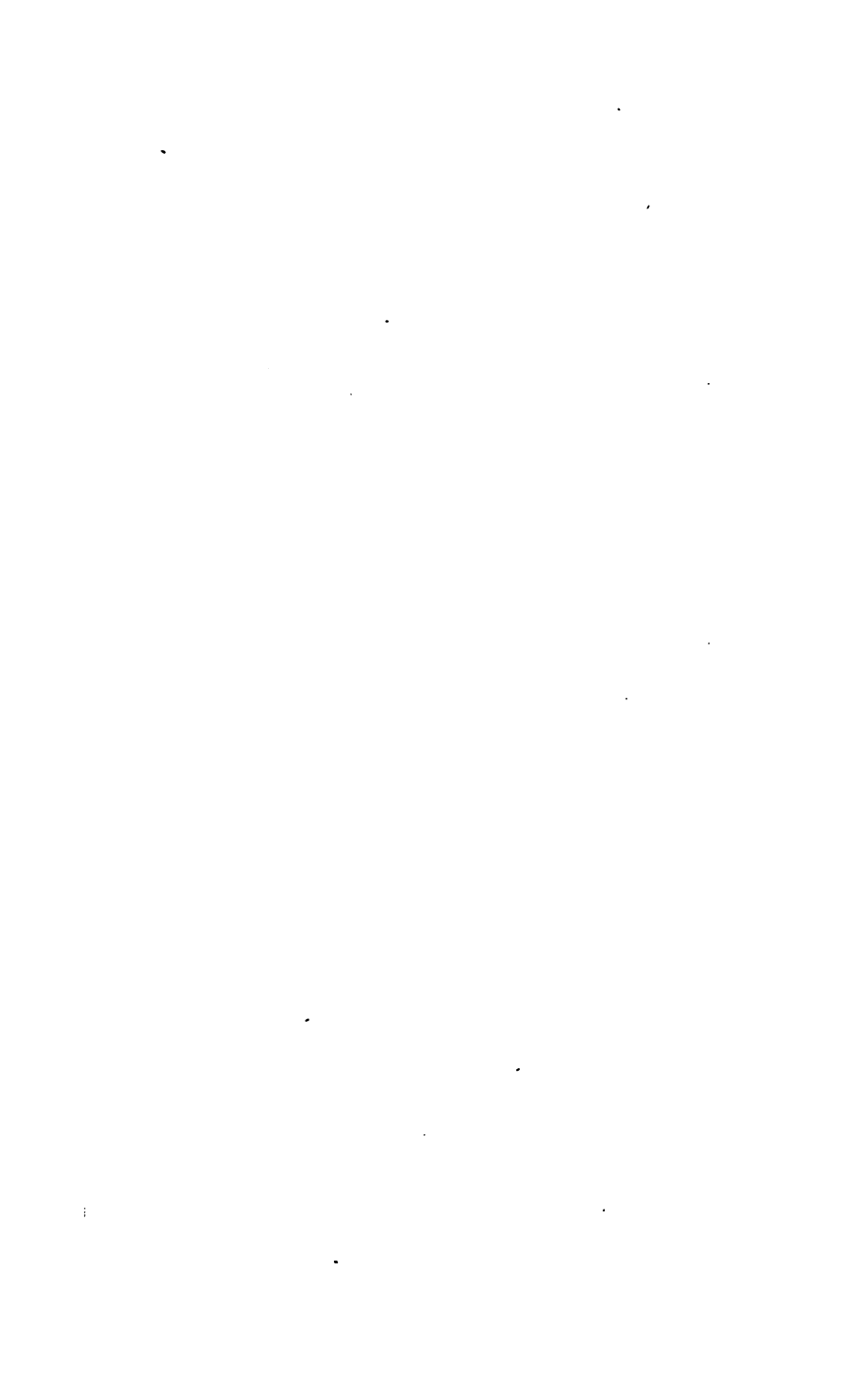
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PREFACE.

THIS work is offered to the public as a small contribution to the railway statistics of this country. The present state of information upon nearly all points affecting the economy of railway working is very limited and incomplete. The author hopes that his labours may be the means of directing to this important subject, the attention of those whose practical experience would enable them to furnish reliable *data*, and qualify them to prosecute with success, the enquiries he has but imperfectly begun. It would be of great advantage to railway interests if a society were to be formed, consisting of the leading railway officials, for the specific object of collecting statistical information, and discussing all questions bearing upon the economical construction and management of railways. Such a society would form the best possible school for future railway managers; and the free interchange of information to which it would give rise, would be productive of the most salutary results.

The author regrets that he has not been able to give the statistics of many railways so fully as he could have wished; but the difficulties of obtaining strictly accurate details, are very great. He is well aware that there is a great amount of most valuable information in existence, on subjects connected with railway working; but it is, generally speaking, guarded as jealously as the fabled golden fleece in the island of Colchis. Still, he indulges in the hope, that the statistics he has been able to give, will be found useful to all who may be interested, in any capacity, in those great national undertakings—the Railways of Great Britain.



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RAILWAYS.

PART II.

CHAPTER I.

INTRODUCTION.

AMONG the various commercial enterprises for which this country is distinguished, there are few, if any, which will bear comparison with railways in interest and importance. Whether we consider the vast amount of capital expended in their construction, the number of persons interested in their prosperity, the social benefits they have conferred upon the community, or the impetus they have given to the commerce and agriculture of the kingdom by the facilities of transit which they afford, they are equally entitled to attention. Probably, no enterprise of ancient or modern times has more materially aided the progress of civilisation, or influenced more beneficially the destinies of mankind. And it may safely be asserted that few undertakings have been so obstinately opposed by rival interests, or had to force the way to success through more formidable obstacles.

The rapidity of the progress of railways in Great Britain has been extraordinary. The lapse of little more than a quarter of a century has sufficed to revolutionise the whole system of travelling. It seems but the other day since we were first startled by the apparently wild and fabulous announcement that passengers had been conveyed on an iron

road, by the agency of steam, at a maximum speed of twenty-nine miles an hour. Many denied and still more doubted the statement, but it was nevertheless an accomplished fact. A few shrewd and far-seeing men had constructed a new highway, and the self-taught genius of Stephenson, amplifying the splendid discoveries of Watt, had effected the rest. In the spring of 1829 the practicability of the general application of steam to the purposes of locomotion was highly problematical. The Liverpool and Manchester Railway was on the eve of completion, but no decision had been come to as to the motive agent to be employed upon it. Stationary engines, and even haulage by horsepower, were among the means seriously discussed for working the line. It is true that locomotives had been employed for some years, in connection with a few of the large collieries, for the conveyance of coals, but they were utterly unsuited, both in construction and capacity, to the requirements of passenger traffic. Sensible of the vital importance of the subject, the directors offered a premium of £500 for the best locomotive adapted to the purposes of their line, one of the conditions being that it should be capable of drawing at least three times its own weight, at a speed of not less than ten miles an hour. Stephenson, among others, devoted his great mechanical abilities to the accomplishment of this object, and before the close of the year his locomotive "the Rocket" had steamed triumphantly along the line in question. It had dashed onwards, amidst the terror of some and the surprise of all, at a speed which then appeared little short of miraculous. The problem had been satisfactorily solved; it became at once evident that the days of the stage coach were numbered, and that it must henceforth give way to its new and more powerful rival. Yet so little were the

most sanguine promoters of railways prepared for this unqualified success,—so little did they appreciate the immense capabilities of the agent they were about to employ, that their expectations were limited to attaining a speed barely equal to that of well-appointed coaches. The late Mr. George Stephenson is said to have stated, that previous to his appearing before the House of Commons' Committee on the Liverpool and Manchester Railway Bill, the directors requested him not to speak of a greater speed than ten miles an hour, or he "would put a cross upon the concern." In the course, however, of his evidence in favour of the bill, he ventured to assert the possibility of running engines at the rate of fifteen miles an hour, upon which a sapient member of the committee asked if he were not mad! Further than this, Mr. Nicholas Wood, a gentleman of no mean abilities and experience, in referring to the views of Stephenson, deliberately expressed himself in a pamphlet thus: "It is far from my wish to promulgate to the world that the ridiculous expectations, or rather professions, of the enthusiastic speculator will be realised, and that we shall see engines travelling at the rate of twelve, sixteen, eighteen, or twenty miles an hour. Nothing could do more harm towards their general adoption and improvement than the promulgation of such nonsense!" These strictures may well provoke a smile when read in contrast with the accounts of recent locomotive performances. Yet the pamphleteer may be excused for his incredulity when we find a late government superintendent of machinery at Woolwich Dockyard, a man of scientific and mathematical reputation, declaring, about the same time, that if a locomotive were made to draw without cogs he would undertake to eat the engine and the rails into the bargain. The event has falsi-

4 ERRONEOUS EXPECTATIONS AS TO REVENUE, &c.

fied his declaration, but the rash prandial vow remains unfulfilled.

Equally erroneous were the expectations which prevailed at this period with respect to the revenue and working-charges of railway undertakings. Selecting the railway before alluded to as an example, the half-yearly income as estimated by its promoters was as follows:—

Net income from passengers	£10,000
Do. goods and cattle	16,250
Do. coals	5,000

Making a total revenue of . . . £31,250

The number of passengers was expected to be from 200 to 250 daily.

To this, the actual result of a half-year's working in 1845 presents the following remarkable contrast:—

Net revenue from passengers	£71,169
Do. goods and cattle	57,603
Do. coals	5,352

Making a total revenue of . . . £134,124

while the number of passengers conveyed was upwards of 1,500 daily, or six times the maximum number first estimated. The working expenses, which had been calculated at thirty-three per cent., were found to amount to little under forty-nine per cent. The capital account, which it was supposed would not exceed six or seven hundred thousand pounds, had reached the formidable sum of nearly one and three-quarter millions sterling. In fine, all the anticipations which were originally formed with reference to railways, whether as to speed and economy, their capital and revenue, or their working expenditure, were alike wide of

the mark. Nor do the directors and shareholders of that day appear to have had any adequate conception of the future magnitude of the undertakings they were promoting, or the important bearing their enterprises would have upon the development of the industrial resources of the kingdom.

It has already been stated that little more than twenty-five years have elapsed since the first introduction of Railways into Great Britain.* During this comparatively short period, however, seven thousand nine hundred miles of railway have been constructed and brought into operation, representing an aggregate capital (inclusive of loans and mortgages) of upwards of two hundred and seventy-three and a quarter millions sterling. If to this be added the capital of lines now in the course of formation, or about to be made, the sum may be stated at three hundred millions. A large amount of British capital has also been expended in promoting lines on the Continent and in our Colonies. This enormous sum of money has been raised without any serious inconvenience or difficulty, or crippling our commercial operations to any sensible extent by the withdrawal of capital. Such a result affords a remarkable instance of the great resources and wealth of this country.

The following is a statement of the length and capital of the several Railways in the United Kingdom, which were in operation in July, 1854. The rates of dividend mentioned are those paid for the first six months in that year.

* This statement, of course, refers to Railways for the conveyance of passengers. Tramways for the carriage of coals had been in use so far back as 1650.

TABLE OF CAPITAL AND DIVIDENDS.

TABLE OF CAPITAL AND DIVIDENDS.

Name of Railway.	Route.	Length in Miles.	Capital.			Dividend per cent. per annum.
			Ordinary.	Preference Loans, &c.	Total.	
1 Aberdeen & Arbroath and Forfar	From Arbroath, via Guthrie, to Forfar; and to Aberdeen, via Marykirk and Stonehaven, with branches to Brechin and Montrose	72½	£ 807,812	£ 1,178,848	£ 1,986,155	Nil
2 Ambergate, Notting- ham and Boston	From Bulwell to Nottingham and Gran- tham	24	728,545	.....	728,545	2 10 0
3 Belfast and Ballymena	From Belfast via Antrim, with branches to Carrickfergus and Randalstown	38	385,000	138,356	513,356	4 4 0
4 Belfast and County Down	From Belfast to Newtownards, with branch to Holywood	17	242,700	.....	242,700	2 12 0
5 Birkenhead, Lanca- shire and Cheshire Junction	From Birkenhead, via Hooton and Sutton, to Chester, and thence, via Acton, to Warrington	32	1,888,111	350,007	2,188,118	2 10 0
6 Blackburn	From Blackburn to Clitheroe and Bolton	26½	494,198	543,356	1,038,054	Nil
7 Blyth and Tyne	From Blyth to Hayhole Tyne and Percy Maine, North Shields	13	100,000	59,350	159,350	2 0 0

TABLE OF CAPITAL AND DIVIDENDS.

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8 Bristol and Exeter	117	2,000,000	1,539,735	3,539,735	4 10 0
9 Caledonian	202	3,049,409	4,726,808	7,776,217	3 0 0
10 Caledonian and Dum- bartonshire.	8½	156,753	23,700	180,453	3 10 0
11 Chester and Holyhead	94½	2,092,890	1,930,904	4,023,794	Nil
12 Cockermouth and Workington	8½	75,220	53,758	128,978	2 10 0
18 Cork and Bandon	20	174,902	127,860	302,762	Nil
14 Cork, Blackrock and Passage	6½	118,386	40,723	159,109	Nil
15 Deaide	16½	71,172	85,380	106,553	5 0 0
16 Dublin and Belfast Junction	56	771,272	210,843	981,614	5 0 0

TABLE OF CAPITAL AND DIVIDENDS.

Name of Railway.	Route.	Length Miles.	Capital.			Dividend per cent. per annum.
			Ordinary.	Preference Loans, &c.	Total.	
17 Dublin and Drogheda	From Dublin to Drogheda, via Malahide and Balbriggan, with branches to Howth and Navan	68	£ 570,375	£ 424,962	£ 995,337	£ s. d. 4 0 0
18 Dublin and Kingstown	From Dublin, via Merrion and Blackrock to Kingstown	8	290,000	70,000	360,000	10 0 0
19 Dundalk and Enniskillen	From Dundalk to Castleblayney, via Inniskeen	25	171,420	84,696	256,116	2 0 0
20 Dundee and Arbroath	From Arbroath to Dundee, via Carnoustie	17	200,000	92,667	292,667	3 10 0
21 Dundee and Perth, and Aberdeen Junction	From Dundee, through Longforgan and Errol, to Perth, with branch to Newtyle	31	299,508	417,584	717,042	Nil
22 East Anglian	From Ely, via Downham, to Lynn, with branch to Wisbeach; and from Lynn, via Swaffham, to Dereham	67½	1,088,607	508,477	1,537,084	Nil
23 East Lancashire	From Liverpool to Blackburn, Burnley, and Colne, via Ormskirk and Preston, and from Manchester to Accrington, via Bury, with branch to Rawtenstall	81½	2,221,300	1,418,899	3,639,699	3 10 0

24 Eastern Counties	From London to Colchester, via Chelmsford, and to Ely and Peterboro, via Cambridge, with branches to Hertford, Hitchin, Huntingdon, and March, Newmarket, North Woolwich, Witham, Braintree, and Sudbury	287	5,830,714	6,032,509	11,863,223	1 15 0
25 Eastern Union	From Colchester to Bury St. Edmund's and Norwich, via Ipswich, with branches to Hadleigh and Sudbury	96	1,206,900	1,631,460	2,838,360	Nil
26 Edinburgh & Glasgow	From Edinburgh, via Linlithgow and Castlecary, to Glasgow, with branches to Lennoxton, &c.	89½	2,213,335	1,432,106	3,645,441	3 0 0
27 Edinburgh, Perth, and Dundee	From Edinburgh, via Leith, Cupar, and Ferryport, to Dundee, with branch from Ladybank to Perth	78	1,280,000	1,873,041	3,153,041	Nil
28 Exeter and Crediton	From Exeter, via St. Cyres, to Crediton	6	70,000	43,333	113,333	Nil
29 Furness	From Peel Pier, Morecombe Bay, to Broughton	18½	175,000	172,243	347,243	6 0 0
30 Glasgow and South Western	From Glasgow to Carlisle, via Paisley, Kilmarnock, and Dumfries, with branches	183½	2,680,110	1,331,165	4,011,275	3 10 0
31 Great North of Scotland	From Aberdeen to Inverness, via Huntly (open to Huntly)	40	160,720	325,175	485,895	—

TABLE OF CAPITAL AND DIVIDENDS.

Name of Railway.	Route.	Length. Miles.	Capital.			Dividend per cent. per annum.
			Ordinary.	Preference Loans, &c.	Total.	
			£	£	£	£ s. d.
32 Great Northern	From London to York, via Peterborough and Doncaster, with loop line from Peterborough to Retford, through Boston and Lincoln, and branches from Boston to Great Grimsby, and Hitchin to Royston	288	4,808,487	5,716,217	10,524,654	2 15 0
33 Great Southern and Western	From Dublin to Cork, via Kildare, Thurles, and Tipperary, with branch to Carlow	188	2,500,000	1,512,987	4,012,987	4 0 0
34 Great Western (including the Shrewsbury and Birmingham, and Shrewsbury and Chester)	From London to Bristol, via Reading and Bath, and to Chester, via Oxford, Birmingham, Wolverhampton, and Shrewsbury, with branches to Windsor, Basingstoke, Hungerford, Cirencester, Gloucester, Dean Forest, Cheltenham, and Warminster.....	395	8,236,276	15,987,795	24,174,071	3 0 0
35 Irish South Eastern	From Carlow to Kilkenny.....	25	231,821	33,500	265,321	1 13 4
36 Kendal and Windermere	From Oxenholme Junction (Lancaster and Carlisle) to Kendal and Birkthwaite (Windermere)	10½	111,700	96,490	208,190	2 0 0
37 Killarney Junction	From the Great Southern and Western Railway, near Mallow, to Killarney ...	40½	112,470	125,000	237,470	Nil

TABLE OF CAPITAL AND DIVIDENDS.

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38 Lancashire and Yorkshire (with North Union and Preston and Wyre)	From Manchester to Huddersfield, Leeds, and Sheffield; to Bury, Bolton, and Liverpool, and to Wakefield, Pontefract, and Goole	241	8,344,660	4,740,810	13,085,470	8 10 0
39 Lancaster & Carlisle	From Lancaster, via Kendal and Penrith, to Carlisle	70	1,187,925	325,460	1,513,385	8 0 0
40 Lancaster & Preston	From Lancaster, via Garstang, to Preston	20	567,772	92,800	660,572	10 5 0
41 Liverpool, Crosby and Southport	From Liverpool, via Formby, to Southport.....	16½	224,000	60,050	284,050	Nil
42 Llandelly Railway	From Llandelly to Garnant and Llandillo	21	199,680	33,020	232,700	Nil
43 Llynvi Valley	To Bridgend	18	69,080	49,175	118,255	5 0 0
44 London & Blackwall	From London to Blackwall	5½	1,266,000	277,900	1,543,900	2 18 8
45 London Brighton and South Coast	From London, via Croydon, to Brighton, Portsmouth, and Hastings, with branches to Horsham, East Grinstead, Newhaven, and Eastbourne	174	4,615,634	2,823,931	7,439,615	4 12 0
46 London and North Western	From London, via Rugby, Birmingham (or Tamworth and Lichfield), Stafford Crewe, and Warrington, to Liverpool and Manchester, with branches to Aylesbury, Dunstable, Bedford, Bletchley, Oxford, and Buckingham, Peterborough, Leamington (from Rugby and Coventry), Nuneaton, Shrewsbury, Chester, &c. ...	689½	22,002,795	14,520,506	36,523,301	5 0 0

TABLE OF CAPITAL AND DIVIDENDS.

Name of Railway.	Route.	Length Miles.	Capital.			Dividend per cent. per annum.
			Ordinary.	Preference Loans, &c.	Total.	
			£.	£	£	£ s. d.
47 London and South Western	From London, via Farnborough, Winchester, and Bishopstoke, to Southampton and Portsmouth, with branches to Hampton Court, Richmond, Windsor, Chertsey, Guildford, Farnham, and Salisbury	267	6,764,962	2,424,927	9,189,889	4 5 0
48 Londonderry and Co- lerraine	From Londonderry, via Downhill, to Coleraine, with branch to Newtownlimavady	37	311,387	229,106	540,493	Nil
49 Londonderry and En- niskillen	From Londonderry, via Lifford and Omagh, to Enniskillen	60	129,200	377,792	506,992	Nil
50 Malton and Driffield	From Malton Junction, on the York and Scarborough Railway, to Driffield, with branch to Frodingham Bridge	20	151,850	96,000	247,850	Nil
51 Manchester, Sheffield and Lincolnshire	From Manchester, via Sheffield, Work- sop, and Gainsborough, to Lincoln, Great Grimsby, and Hull, with branches to Huddersfield, Barnsley, Ashton, and Slaitybridge, and Eckington	176	3,946,784	4,063,960	8,010,744	Nil
52 Maryport & Carlisle	From Carlisle, via Wigton, to Maryport	28	167,175	289,197	456,372	3 0 0

TABLE OF CAPITAL AND DIVIDENDS.

13

		9	42,288	31,790	74,078	4 0 0
53 Middlesbrough and Guisborough	From the Redcar branch of the Stockton and Darlington Railway at Middles- brough to Guisborough, with branch to Cleveland	9				
54 Midland	From Derby to Birmingham, Worcester, Gloucester, and Bristol, to Chesterfield, Rotherham (Masbro') and Normanton, and to Loughborough, Leicester, and Rug- by, with branches to Leeds and Bradford, Doncaster, Sheffield, Matlock, Notting- ham, Mansfield, Lincoln, and Peterborough	504	9,129,859	10,013,006	19,142,865	3 10 0
55 Midland Great Wes- tern of Ireland	From Dublin, via Mullingar and Athlone, to Galway, with branches (not yet open) to Longford and Cavan	126	917,890	471,740	1,389,630	5 0 0
56 Monkland	From Linlithgow to Glasgow, via Sla- mannan	37	329,880	246,627	576,507	4 10 0
57 Monmouthshire	From Newport to Pontypool, &c.	13	360,000	380,790	740,790	5 0 6
58 Morayshire	From Lossiemouth Harbour to Elgin and Rothies	11½	29,068	11,877	40,945	2 10 0
59 Newcastle & Carlisle	From Newcastle, via Hexham and Halt- wistle to Carlisle, with branches to Alston and Swalwell	78½	1,118,152	767,043	1,885,195	4 10 0
60 Newport, Abergaven- ny, and Hereford	From Newport, Llanfair, and Aberg- venny, to Hereford	33	401,948	218,870	615,818	Nil

TABLE OF CAPITAL AND DIVIDENDS.

Name of Railway.	Route.	Length. Miles.	Capital.			Dividend per cent. per annum.
			Ordinary.	Preference Loans, &c.	Total.	
			£.	£	£	£ s. d.
61 Newry & Enniskillen	From Newry to Goragh Wood Junction	3½	115,270	.....	115,270	Nil
62 Newry, Warrenpoint and Rostrevor	From Newry to Rostrevor, via Warren- point	6	88,625	21,948	105,573	Nil
63 Norfolk	From the Eastern Counties' Railway at Brandon, to Norwich and Yarmouth, via Thetford, with a branch to Lowestoft	94	1,002,190	1,218,978	2,221,168	2 0 0
64 North British	From Edinburgh to Berwick, via Dunbar, with branches to Leith, Musselburgh, Dalkeith, St. Leonard's, Haddington, North Berwick, Dunse, Hawick, and Kelso	149	2,578,333	1,857,384	4,430,717	Nil
65 North Devon	From Crediton to Barnstaple	32½	299,854	130,522	430,376	2 0 10
66 North Eastern, com- prising—1 York, New- castle, and Berwick; 2 York and North Midland; 3 Leeds Northern	From Berwick, via Newcastle and Dar- lington, to York; from Thirsk to Leeds, Northallerton, and Stockton; from Leeds to Milford, Selby, and Hull; and from York to Scarborough and Hull, with branches to Kelso, Alnwick, Monk- wearmouth, Sunderland, Durham, North Shields, and Tynemouth, Harrogate, Paisher, Market Weighton, Bedale, Hartlepool, Richmond, &c. &c.	682	10,888,864	10,088,629	20,977,493	Y. N. & B. 3 15 0 Y. & N. M. 2 5 0 L. N. Nil

TABLE OF CAPITAL AND DIVIDENDS.

15

67 North London	From Stepney, London, to Bow and Hampstead Heath	8½	817,150	381,505	1,198,655	5 0 0
68 North Staffordshire	From Macclesfield to Leek, Uttoxeter, and Burton on Trent; and to Congleton, Burslem, Hanley, and Colwich, with branches to Ashbourne, Crewe, Newcastle-under-Lyme, and Norton Bridge	121½	2,826,372	1,092,576	3,918,948	3 5 0
69 North Western	From Skipton, on the Leeds and Bradford Railway, to Lancaster and Morecombe, via Settle.....	47	747,460	328,683	1,076,143	0 15 0
70 North and South Western Junction	From Kew, via Acton, to Hampstead Road, London.....	4	49,900	19,100	69,000	2 0 0
71 Oxford, Worcester, and Wolverhampton	From Oxford, via Evesham, Pershore, Kidderminster, and Stourbridge, to Dudley and Wolverhampton, with branch from Moreton to Stratford-on-Avon ...	91	1,418,225	1,968,399	3,386,624	Nil
72 Saint Andrews	From Milton Junction, on Edinburgh, Perth, and Dundee Railway, to St. Andrew's ..	4½	18,375	6,250	24,625	4 10 0
73 Saint Helen's	From St. Helen's to Runcorn, with branches to Garston, Warrington and Blackbrook	20½	316,800	721,632	1,038,432	0 10 0
74 Scottish Central	From Falkirk, on the Edinburgh and Glasgow, and Castlecary, on the Caledonian Railway, to Perth, via Stirling, with branch to Alloa	50	1,020,000	570,397	1,590,397	4 10 0

Name of Railway.	Route.	Length. Miles.	Capital.			Dividend per cent. per annum.
			Ordinary.	Preference Loans, &c.	Total.	
			£	£	£	£ s. d.
75 Scottish Midland	From Perth to Forfar, via Cupar Angus, with branch to Kirriemuir	32½	587,700	113,624	701,324	2 15 0
76 Shrewsbury & Here- ford	From Hereford, via Leominster and Lud- low, to Shrewsbury	51	353,965	.....	353,965	4 0 0
77 South Devon	From Exeter, via Dawlish, Teignmouth, and Totness, to Plymouth, with branch to Torquay	53	997,600	1,029,393	2,026,993	1 2 0
78 South Eastern	From London, via Croydon, Edenbridge, Staplehurst, and Ashford, to Folkestone, and Dover, with branches to Greenwich, Strood, Reading, Hastings (via Tunbridge Wells), Maidstone, Hastings (via Rye), Canterbury, Ramsgate, and Margate ...	289	7,433,700	5,171,047	12,604,747	2 16 8
79 South Staffordshire	From Dudley, via Walsall and Lichfield, to Rushall, Midland Railway	26	519,147	.....	519,147	4 0 0
80 South Wales	From Haverford-West, via Caernarthen, Llanelli, Swansea, Cardiff, Newport, and Chepstow, to Gloucester	162½	2,444,250	1,382,696	3,826,946	Nil
81 South Yorkshire	From Doncaster to the Midland Counties' Railway at Swinton, and from Sheffield to Barnsley	86	529,241	519,147	1,048,388	4 0 0

82 Stirling and Dunfermline	From Dunfermline, via Kincardine and Alloa, to Stirling.....	21	388,046	120,852	515,398	Nil
83 Stockton and Darlington	From Redcar to Cold Rowley, via Middlesbrough, Stockton, Darlington, Bishop Auckland, and Crook, with branch to Frosterley	90	370,199	1,689,177	2,059,376	7 10 0
84 Taff Vale and Aberdare	From Merthyr Tydvil, via Newbridge, to Cardiff, with branch to Aberdare	38	621,585	461,756	1,083,341	7 10 0
85 Vale of Neath	From Merthyr Tydvil to Neath, via Aberdare.....	25	496,267	181,580	677,847	8 0 0
86 Ulster	From Belfast, via Lisburn and Portadown, to Armagh	35½	508,767	199,960	708,727	5 16 8
87 Waterford and Kilkenney	From Kilkenny, via Ballyhale, to Waterford.....	29	248,730	271,813	520,543	Nil
88 Waterford and Limerick	From Waterford, via Clonmel, Tipperary, and Dromkein, to Limerick.....	77	490,000	419,200	909,200	1 0 0
89 West Cornwall	From Penzance, via Hayle and Redruth, to Truro	25	298,685	160,568	459,253	0 10 0
90 West Hartlepool	From Hartlepool to Port Clarence, Stockton, and Coxhoe	48	498,510	971,563	1,465,073	4 0 0

TABLE OF CAPITAL AND DIVIDENDS.

Name of Railway.	Route.	Length. Miles.	Capital.			Dividend per cent. per annum.
			Ordinary.	Preference Loans, &c.	Total.	
91 West London	From the London and North Western Railway near Kensal Green, to the Ken- sington Canal	3	£ 109,880	£ 47,900	£ 157,080	Nil
92 Whitehaven and Fur- ness	From Whitehaven, via Ravenglass and Bootle, to Broughton	34	257,632	162,177	419,809	Nil
93 Whitehaven Junction	From Whitehaven, via Workington, to Maryport.....	12	100,000	76,000	176,000	4 0 0
	Total.....	7892½	149,207,375	124,157,556	273,364,931	—

From the foregoing table it appears that the total number of miles of railway open in Great Britain in July, 1854, (including the Great North of Scotland, which, however, was not opened till September), was 7892. The amount of ordinary or unguaranteed capital expended in their construction and for working plant up to that date was £149,207,375; and the amount of preference or guaranteed capital (including debentures, temporary loans, and calls paid in advance) was £124,157,556, making a total capital of £273,364,931, equal to £34,638 per mile. The gross sum paid for dividends, in respect of the ordinary shares, for the first six months of that year was £2,340,391, equivalent to 3·14 per cent. per annum. The amount of interest paid on the guaranteed capital, loans, &c., was £2,680,731, or equivalent to 4·32 per cent. per annum. The gross sum paid for dividends and interest on the aggregate capital was £5,021,122, being equal to 3·67 per cent. So that, supposing an investor to have taken an original share in each of the Railways enumerated, and also to have subscribed his due proportion of the other descriptions of capital, he would have received for the half-year referred to, interest at the rate of about £3 14s. per cent. per annum. It must be confessed that this is but a low rate of interest, especially when it is remembered that a great part of his capital must have lain unproductive for a considerable time during the formation of the several lines, but few of which paid interest upon calls.

Of the ninety-five* railways to which the tabulated statement refers, there are fifty-nine in England and Wales, the total length of which is 5988 miles, and the capital

* The North-Eastern is treated as three distinct lines for the purposes of these statements, which increases the number in the table by two.

£230,007,079. The dividends paid by these lines for the first half-year of 1854 were as follows:—

		£	s.	d.	
One	paid	10	5	0	per cent. per annum.
One	"	9	0	0	" "
One	"	8	0	0	" "
Two	"	7	10	0	" "
One	"	6	0	0	" "
Four	"	5	0	0	" "
Ten	"	4	0	0	" and under £5
Eight	"	3	0	0	" " 4
Eleven	"	2	0	0	" " 3
Two	"	1	0	0	" " 2
Three	"	less than £1. per cent.			

And fifteen companies declared no dividend upon their ordinary stock.

There are in Scotland seventeen railways; length, 1043 miles; capital £30,234,652; dividends as under:—

		£	s.	d.	
One	paid	5	0	0	per cent. per annum.
Three	"	4	10	0	" "
Three	"	3	10	0	" "
Two	"	3	0	0	" "
One	"	2	15	0	" "
One	"	2	10	0	" "

Five paid no dividend on their original shares, and one was only recently opened.

There are in Ireland nineteen lines; length, 861 miles; capital, £13,123,200; and dividends as below:—

		£	s.	d.	
One	paid	10	0	0	per cent. per annum.
One	"	5	16	8	" "
Two	"	5	0	0	" "
Three	"	4	0	0	" and under £5
Two	"	2	0	0	" " 3
Two	"	1	0	0	" " 2

And eight paid no dividend on their ordinary capital.

Thus there are in the United Kingdom twenty-eight railways which yield no return upon their ordinary share capital.

In other words, upwards of twenty-two millions of the capital invested in these important undertakings are utterly unproductive.

The average dividends of some of the principal paying lines during the four years from July, 1850, to June, 1854, were as follows:—

AVERAGE DIVIDENDS, 1850-4.

Name of Railway.	Amount paid upon Shares, 1854.	Average amount of dividend per annum.		
	£.	£.	s.	d.
Ambergate . . .	8½	1	12	9
Belfast & Ballymena . .	50	3	7	0
Bristol & Exeter . . .	100	4	6	3
Caledonian	100	1	9	0
East Lancashire . . .	100	2	13	6
Eastern Counties . . .	20	1	16	10
Edinburgh & Glasgow . .	100	3	0	0
Glasgow & South Western	100	2	10	7
Great Northern . . .	100	2	6	7
Great Southern & Western	100	4	0	0
Great Western	100	4	0	0
Lancaster & Carlisle . .	50	7	6	3
Lancashire & Yorkshire . .	100	2	18	2
London & North Western	100	5	6	3
Do. & South Western	100	3	19	4
Do. & Brighton . . .	100	4	14	6
Midland	100	2	16	3
Newcastle & Carlisle . .	100	4	0	0
Norfolk	100	1	17	6
North Staffordshire . . .	17½	2	4	10
Scottish Central . . .	100	3	4	3
South Eastern	100	3	2	11
York & North Midland . .	100	1	19	4
Do. Newcastle & Berwick	100	3	5	0

Thus we see that during five years of almost unexampled commercial prosperity, the returns on the "paying lines," lines which intersect the richest agricultural and manufacturing districts of the kingdom,—only admitted of an average yearly dividend of 3·8 per cent. The present (April 1855) market value of the ordinary shares of fifty-four of the principal railways, shews a depreciation equal to 39 per cent on the amount paid up. These unfortunate results have not arisen from over estimating the revenue (which in almost every instance far exceeded the anticipations of the most sanguine), but from swelling the capital accounts far beyond the original estimates. This increase is traceable to various causes, the principal being the heavy sums expended in parliamentary contests; the exorbitant amounts paid for land and compensation; extravagant outlay in construction; ruinous guarantees, leases and purchases of other undertakings; and the formation of branch lines through barren and profitless districts. As these causes are to a great extent still in operation, and as their removal or modification is a condition essential to the further profitable extension of the railway system, it is necessary to glance at them in detail.

Legal and Parliamentary Expenses.—A return to an order of the House of Commons, dated May, 1854, shews that a sum of four millions sterling has been expended by ninety-nine railways in legal and parliamentary expenses. This return does not include the amounts disbursed by the London and North Western and Great Western* Companies (which,

* Mr. Salt in his useful statistical work entitled "Railway and Commercial information," states that in 1848 the Great Western Company were indebted to counsel alone for fees in the sum of £30,000.

from the long and desperate struggle of these leviathan rivals for supremacy, must necessarily have been enormous) nor of the Eastern Counties, Caledonian, Lancashire and Yorkshire, London and Brighton, Manchester, Sheffield and Lincolnshire, North Eastern, Midland, South Eastern and several other companies. If returns from these bodies were included, the amount of this unprofitable expenditure would, in all probability, reach 8 or 9 millions. Or we might venture to state in round numbers that each mile of railway has cost on an average £1,000 in parliamentary and legal expenses. The Great Northern Company, with its 283 miles of railway has expended £683,053 on this item, or upwards of £2,400 per mile; the Cornwall has paid £129,147; the Eastern Union £242,385; the Edinburgh Perth and Dundee £165,952; the Glasgow and South Western £182,057; the South Western £279,500; and the Shropshire Union £111,855. The six companies last mentioned have therefore, according to this return, expended £1,110,897 in legal and legislative expenses, or more than £1507 per mile. It is discreditable to the legislature that such a tax upon railway enterprise should exist. The late Sir Robert Peel stated that by the extension of railways we were "laying the foundation of great future prosperity"; yet every impediment has been thrown in the way of their progress; and the unwise and variable policy of parliament with reference to railways, must be ranked as one of the principal causes of their present depressed financial condition.

Exorbitant Sums paid for Land and Compensation.—The sums paid by many of the railway companies for land and compensation are almost fabulous. Property valued at £5,000 has been sold to a railway company for £120,000.

A great portion of the land taken for railway purposes has realised to the fortunate owners from £2,000 to £10,000 an acre. It is recorded that the sum paid to one particular individual was so preposterously large that his heir returned the greater portion of it as conscience money! In another instance, the proprietor of a small piece of land received £5,000 compensation for the loss of the minerals under it, those minerals having been worked out as far as was practicable, and the remainder being hopelessly submerged in water. Their market value was actually and literally nothing: a railway land agent appeared upon the scene, and they were immediately transmuted into gold. It is needless however to multiply examples: the fact is notorious that railway companies have in the majority of cases paid from ten to a hundred fold beyond the legitimate value of the properties purchased by them.

Extravagant Outlay in Construction.—As if railways had not suffered sufficiently at the hands of legislators, lawyers and landowners, reckless extravagance in their construction has, in too many instances been super-added. Ornamental structures of a costly character have been erected where plain but substantial buildings would have answered every requirement; double lines have been constructed in cases where single lines would have fully accommodated all the traffic; works have been carried on at a lavish rate of expenditure, and no attempt made to economise; contractors have rapidly amassed magnificent fortunes, and become the envied purchasers of princely domains. When these circumstances are considered, is it at all surprising that so many of our railways have proved to be such indifferent investments?

Ruinous Guarantees, &c.—Of all the causes which have

tended to depreciate the value of Railway property none have had a more prejudicial effect than the system which has obtained of recklessly guaranteeing other undertakings, and of constructing branches through districts possessing no remunerative traffic. Trunk lines, containing within themselves all the elements of prosperity, have thus been brought to the verge of bankruptcy. Instance the Caledonian. This Company, in addition to various share transactions, liberally guaranteed to other lines dividends ranging from six to eight per cent., until its liabilities under this head alone amounted to £153,420 annually. But its directors were liberal before they were just; and the natural consequence of this course of procedure was, that the company was soon unable to meet its engagements. The intervention of the legislature was sought and obtained, and the undertaking was only saved from utter ruin by the Arrangement Act of 1851. Then, again, the London and North-Western, as a trunk line from the Metropolis to Birmingham and Liverpool, realized a yearly dividend of ten per cent. This was, unfortunately, too good to last. Competition was threatened, the directors became alarmed for their property, rushed into leases and guarantees, and threw out branch-lines,—without any regard to their productiveness,—to every point likely to stop any move made by an opposing line. What has been the result? The dividend has dwindled down to five per cent. The profits accruing from the main line traffic are half swallowed up by such absorbers as the Buckinghamshire, Trent Valley, and Shropshire Union. Again, take the case of the North British. So long as it was simply a line from Edinburgh to Berwick it paid a good return upon its capital. Indeed, at that period it was

offered to be purchased at eight per cent. But its directors, following in the wake of other companies, promoted several branches which it was thought would be valuable feeders to the main line. They have proved to be the very opposite, and have sucked it financially dry. The undertaking is consequently in a prostrate condition, paying no dividend, and its £100 stock now selling for £29. It would be an easy matter to adduce numerous other examples, but these will suffice.

While the adverse influences to which we have briefly adverted continue in operation, it is futile to expect any further considerable extension of the railway system. Yet it is highly desirable that no town or village of importance should be left without the advantages of railway communication. Every locality so situated is completely isolated, shut out from the markets of the world, and must, as an inevitable consequence, decline in prosperity. The great streams of traffic now flow only through railway channels, and to be intersected by a railroad is a matter of vital necessity to the prosperity of any district. It is, therefore, the imperative duty of the legislature to foster these undertakings, and remove every legal impediment to their progress. Facilities should be afforded for obtaining acts of incorporation by means simple and inexpensive. Competing lines, and the ruinous contests they involve, should be discouraged as being, in the end, contrary to the public interests. A more independent attitude should be assumed by railway promoters towards landowners. Wherever a railway traverses, the land in its vicinity is greatly increased in value. In fact, as a class, landowners have derived more pecuniary benefit from the introduction of railways than

any other persons. They must, therefore, in future be content to surrender, at its fair market value, the land required for railway purposes. They must become cordial promoters, not remain greedy antagonists, bearing in mind that their land, wanting the facilities of communication which railways afford, loses half its value. Great circumspection should be exercised by directors in forming branch lines, the cost of which should be carefully ascertained beforehand. The works must be strictly limited to the actual requirements of the anticipated traffic, and be constructed within the estimates. If all these conditions be strictly fulfilled, a great impetus will be given to the progress of railways; their extension will be pushed to the furthest practicable limit, and the nation will then enjoy the incalculable advantages arising from their full development.

CHAPTER II.

ONE of the most important enquiries which arises in connection with the financial position of railways, relates to their working charges. The errors and mismanagement which have led, in so many instances, to a profuse expenditure of capital cannot now be remedied. The traffic returns seem to have reached their culminating point, and, save in a few exceptional cases, the probability of any appreciable increase under this head is very remote. The only chance, therefore, of railway shareholders obtaining a better return upon their capital, appears to be contingent upon a reduction of the working expenses. To this important subject

the attention of all those interested in railway management should be specially directed. At the same time, it must be premised that it is a question beset with considerable difficulty. Arbitrary reductions of expenditure, prompted by mistaken notions of economy, are invariably productive of evil results. Every suggestion to economise by depreciating the condition of the rolling stock should be at once scouted, as tending to impair the efficiency and endanger the safety of the working of the line. No real saving can possibly be effected by such means ; on the contrary, the ultimate effect will infallibly be greatly increased expenditure. Economy of working would be more effectually promoted by the various companies adopting one uniform system of recording their working expenditure, and freely interchanging this information with each other. Each individual company would thus have the advantage of the collective experience of all. It is only by carefully comparing the results of working on other lines similarly circumstanced with their own, that the managers of any railway can ascertain whether or not the several departments under their control are conducted with due economy.

With the view of forming a basis for the comparison alluded to, the following details are given of railway working in Great Britain for various half-years from 1850 to 1855. These statistics have been carefully compiled from the official documents published by the respective companies.

ABERDEEN RAILWAY.

Half-year ending December 31st, 1851.

Total Receipts for the half-year	£36,171
Ditto Expenses ditto.....	22,475

DETAIL OF EXPENDITURE.

	Per Train Mile. D.	Per Centage to Receipts.
Maintenance of Way, &c.	4·383	11·21
Engines, Carriages, and Waggons, working, and repairs	9·563	24·57
Coaching Charges.....	1·542	3·95
Merchandise ditto.....	3·071	7·85
Police, &c., ditto	0·610	1·56
General ditto.....	3·251	8·31
Total Working Charges	22·420	57·45
Rates, Taxes, and Government Duty	1·830	4·69
Total Expenses.....	24·250	62·14

ARBROATH AND FORFAR, 1845.

	Per Train Mile. D.
Coke.....	4·785
Wages to Enginemmen and Firemen	1·257
Oil, Tallow, Waste, &c.	0·417
Repairs to Engines	1·330
Total Working Charges	7·789
Carriage working and repairing	0·549
Waggon do. do.	1·472
Total expenses.....	9·810

BRISTOL AND EXETER.

Half-year ending June 30th, 1851.

	Per Train Mile. D.
Coke	3·788
Wages to Enginemmen, Firemen, and cost of running and repairing engines	6·549
Total cost Locomotive Power	10·337

	Per Train Mile.
Carriage and Waggon repairs	0·987
Total Engines, Carriages, and Waggon...	<u>11·324</u>
Per centage of total working expenses to receipts 41·44.	

Half-year ending December 30th, 1851.

	Per Mile. £
Permanent Way, Superintendence	1·90
Maintenance of Way, Works, and Stations.....	113·75
Total Cost per mile	<u>£115·65</u>

LOCOMOTIVE POWER.

Mileage.—Passenger, 254,215; Goods, 65,861, Piloting, 7,608.
Total, 327,684 miles.

	Per Train Mile. D.
Superintendence	0·112
Coke and Coals	3·726
Wages to Enginemen, Firemen, &c.	3·315
Repairs and Incidentals	3·467
Total Engine Power	<u>10·620</u>
Repairs to Carriages and Waggon	0·772
Total Engines, Carriages, and Waggon...	<u>11·392</u>

GENERAL EXPENDITURE.

	Per Train Mile. D.	Per Centage to Receipts.
Maintenance of Way ..	7·987	8·34
Locomotive Power, Carriages and Waggon	11·392	10·34
Coaching and Merchandise charges.....	6·276	6·55
General charges	5·409	5·65
Total Working Expenses	<u>31·064</u>	<u>30·88</u>
Government Duty, Rates and Taxes	5·340	5·57
Total Expenses	<u>36·404</u>	<u>36·45</u>
Total Receipts for the half-year	£127,643	
Do. Expenses do.	<u>46,562</u>	

Half-year ending June 30th, 1854.

Maintenance of Way per mile £215·27

LOCOMOTIVE EXPENSES.

Passenger Mileage, 285,771; Goods ditto, 116,765; Total Train Mileage, 402,536; Piloting, 11,687; Total Engine Mileage 414,223.

	Per Train Mile.
	D.
Coke and Coal.....	3·76
Wages to Enginemen, Fitters, &c.....	5·08
Stores and Materials	2·76
Total Cost of Locomotive Working and Repairs.....	11·60
Carriage and Waggon repairs.....	1·77
Total Engines, Carriages, and Waggons	<u>13·37</u>

Consumption of Coke per mile Passenger Trains, 25·89 lbs.; Goods ditto, 50·06 lbs.

GENERAL EXPENDITURE.

£		Per Centage to Receipts.
24,110	Maintenance of Way	16·71
19,470	Locomotive Expenses	13·50
2,960	Carriage and Waggon repairs	2·04
12,442	Traffic charges	8·62
8,278	General ditto	5·73
67,260	Total Working Charges	46·61
8,085	Rates, Taxes, and Government Duty	5·60
<u>75,345</u>	Total Expenses.....	<u>52·21</u>

RECEIPTS.

	£	Per Cent to gross receipts.
Passengers, Parcels, and Mails	93,459	64·80
Goods and Cattle	47,295	32·76
Sundries	3,525	2·44
Total	<u>144,279</u>	
Total Expenditure	<u>75,345</u>	

Gross Receipts per mile for the half-year, £1288·20; Ditto Expenses, £672·70; average Weekly Receipts per mile, £49·50; Ditto Expenses ditto, 25·90.

CALEDONIAN.

Half-years ending January and July, 1851.

LOCOMOTIVE POWER.

	January. Per train mile. D.	July. Per train mile. D.
Engine Working.....	5·267	5·539
Ditto Repairing	3·124	3·249
Total cost Locomotive Power ...	8·391	8·788
Carriage and Waggon working and repairing	2·289	2·163
Total Engines, Carriages, and } Waggons	10·680	10·951

Half-year ending January 31st, 1852.

Mileage—Passengers, 473,691; Goods, 296,232; Mineral, 251,499; Total Train Miles, 1,021,422; Piloting, &c., 95,361; Total Engine Mileage, 1,116,783.

	Per Train Mile. D.
Engine Working	5·183
Ditto Repairing	2·426
Total cost for Locomotive Power	7·609
Carriages and Waggons—Working	0·472
Ditto Repairing	1·701
Total cost Engines, Carriages, and Wag- } gons, working and repairs	9·732

GENERAL EXPENDITURE.

	Per Mile. £	Per Centage to Receipts.
Maintenance of Way, &c.	4·012	7·75
Locomotive expenses	7·954	15·38
Coaching charges	2·333	4·51
Merchandise and Mineral ditto	4·333	8·32
General charges	1·365	2·64
Clearing House Compensation, Law, &c. ...	1·782	3·45
Total Working Charges	21·779	42·05
Rates, Taxes, and Government Duty	0·654	1·29
Total Expenses.....	22·433	43·34
Total Receipts for the half-year	£220,063	
Ditto Expenses ditto	95,376	

Half-year ending July, 1854.

PERMANENT WAY.

	Per Mile. £
Maintenance of Line	74·45
Ditto Stations	11·96
Total per mile	£86·41

GENERAL EXPENDITURE.

£		Per Centage to Receipts.
17,455	Maintenance of Way	6·273
43,446	Locomotive Power	15·615
10,053	Carriage and Waggon repairs.....	3·613
13,816	{ Coaching traffic charges, including Compensation, proportion for Police, &c. }	4·966 ... 11·92
23,711	Goods, ditto ditto.....	8·522 ... 14·97
4,471	Feu Duty, &c.	1·607
112,952	Carried forward	40·596

112,952	Brought forward	40-593
11,511	{ General charges (including Law and Parliamentary charges, £2,020) }	4-137
124,463	Total Working Charges ...	44-735
3,550	{ Government Duty, Rates, and Taxes	1-256
128,043	Total Expenses	46 019

RECEIPTS.

	^{d.} £	Per Centage to Gross Receipts.
1,982,327 Passengers, producing (= 11-59 each).....	95,776	41-64
Mails, Parcels, Season Tickets (£943), Horses, Cattle, Carriages, and Dogs	20,090	
Merchandise and Minerals	158,417	
Total Traffic Receipts.....	£274,273	
Sundries	3,946	1-42
Gross total Receipts	£278,219	
Ditto Expenses	128,043	
Balance	150,176	
Interest on Loans and Guaranteed Dividends	90,243	
Balance applicable to Dividend on Ordinary Shares.....	£59,933	

Total Receipts per mile for the half-year, £1377-32; ditto Expenditure, £633-88. Average Receipts per mile weekly, £53-0; ditto Expenditure weekly, £24-38.

EASTERN COUNTIES RAILWAY.

Cost of Locomotive, Carriage, and Waggon working and repairing in 1845, per train mile, 17-0d.

Half-year ending July 4th, 1851.

	Per mile.
Maintenance of Way and Stations	£91·05

LOCOMOTIVE POWER.

	Per Train Mile.
	D.
Engine working and repairing	10·573
Carriage and Waggon ditto	3·217
Total	<u>13·790</u>

GENERAL EXPENDITURE.

	Per Train Mile.	
	Passengers.	Goods.
	D.	D.
Locomotive Expenses	13·247	14·774
Maintenance of Way	5·724	5·724
Miscellaneous Working Expenses.....	16·972	16·972
Total	<u>35·943</u>	<u>37·470</u>

Half-year ending January, 1852.

	Per Mile.
Maintenance of Way and Stations.....	£93·02

LOCOMOTIVE POWER.

Mileage—Passengers, 920,388; Goods, 432,986; Piloting and Light Running, 53,057; Total Engine Mileage, 1,406,431.

	Per Train Mile.
	D.
Enginemen and Firemen's Wages	1·468
Coke.....	3·046
Oil, Tallow, Waste, Firewood, &c.....	0·278
Labourers and Cleaners	0·631
Water	0·146
Superintendence	0·208
Total cost of Working.....	<u>5·777</u>
Shunting	0·420
Repairing Engines	1·755
Renewals of ditto	<u>1·383</u>
Total cost of Locomotive Power	<u>9·335</u>
Carried forward	9·335

	Per Train Mile.
	D.
Brought forward	9·335
Carriage and Waggon Repairs, &c.....	1·386
Ditto ditto Renewals	0·734
	<hr/>
Total Engines, Carriages, and Waggons ...	11·455
	<hr/>

GENERAL EXPENDITURE.

	Per Train Mile.	
	Passengers.	Goods.
	D.	D.
Locomotive Power, Carriages, and Waggons	11·223	11·946
Maintenance of Way, Stations, &c.	2·857	2·857
Miscellaneous Working Expenses.....	15·018	15·018
	<hr/>	<hr/>
Total Working Expenses	29·098	29·821
Rates, Taxes, and Government Duty	4·445	2·270
	<hr/>	<hr/>
	33·543	32·091
	<hr/>	<hr/>

Half-year ending July 4th, 1853.

PERMANENT WAY.

	Per Mile.	
	£	
Superintendence	1·401	} Average per Train Mile d.3 072.
Maintenance of Way	47·970	
Stations	9·146	
	<hr/>	
	£58·517	
	<hr/>	

LOCOMOTIVE POWER.

Mileage—Passenger Trains, 1,020,174; Goods, 605,100; Total Train Miles, 1,625,274; Piloting, &c., 47,668; Total Engine Mileage, 1,672,942.

Coke, Passenger Trains, 17·08 lbs. per mile, cost, 1·974d.; Goods, 33·67 lbs., cost, 3·89d.; Piloting, 27·32 lbs., cost, 3·16d.; Average, 25·37 lbs., cost, 2·70d. per mile.

LOCOMOTIVE POWER.

	Per Train Mile. 1853.	Corresponding Period, 1852.
	D.	D.
Wages to Enginemen and Firemen	1·541	1·586
Coke	2·780	2·528
Oil, Tallow, Water, Firewood, &c.	0·309	0·312
Labourers and Cleaners	0·635	0·656
Water	0·143	0·134
<hr/>		
Total cost of Locomotive Working	5·408	5·216
Repairs	1·596	1·903
Renewals	0·592	1·092
<hr/>		
Total Working and Repairing ...	7·596	8·211
Engine Power for Shunting	0·160	0·449
Carriage and Waggon repairs	1·073	1·447
Ditto ditto renewals	0·942	0·813
Superintendence	0·167	0·192
<hr/>		
Total Engines, Carriages and } Waggons	9·938	11·112
<hr/>		

Cost of Locomotive Power for Passenger Trains, including repairs and renewals, 9·94d. per Train Mile; Ditto Goods ditto, 11·12d. per Train Mile.

GENERAL EXPENDITURE.

£		Per Centage to Receipts.
19·135	Maintenance of Way and Stations	4·496
61·845	Locomotive expenses	14·531
62·484	Traffic ditto	14·682
17·880	{ General ditto, including Telegraph, } Lowestoft Harbour, &c.	4·201
<hr/>		
161·344	Total Working Expenses	37·910
19·187	Rates, Taxes and Government Duty ...	4·509
<hr/>		
180·531	Total Expenses	42·419
<hr/>		

STATISTICS.

RECEIPTS.

	£	Per Centage to Gross Receipts.
1,850,608 Passengers (= 24·6d. each) ...	189,503	} 49·92
Parcels, Mails, &c.	22,974	
Goods, Coal, &c.	162,856	38·27
Cattle	36,683	8·62
Sundries	13,681	3·19
	<u>£425,597</u>	<u>100·00</u>

Average Receipts per Train Mile on Main Line	^{d.} 72·113
Ditto ditto Norwich	} 52·828
and Lowestoft Branch	

Gross Receipts per Mile for the half-year ...	[£] 1301·52
Ditto Expenses ditto ditto ...	552·08
Average Receipts per Mile Weekly	50·06
Ditto Expenses ditto	<u>21·23</u>

Half-year ending June, 1854.

MAINTENANCE OF WAY.

	Per Mile. £
Superintendence	1·283
Maintenance of Line	51·257
Repairs and Alterations of Stations, &c.	18·659
Total	<u>71·199</u>

GENERAL EXPENDITURE.

£		Per Centage to Receipts.
29,690	Maintenance of Way	5·343
78,605	{ Locomotive Power, repairs and re- newals	} 14·146
19,669	{ Carriage and Waggon works and ditto ditto	
		3·540
33,163	Coaching Charges	5·968 ... 12·18
161,127	Carried forward	<u>28·997</u>

£		Per Centage on Receipts.	
161,127	Brought forward	28·997	
			Per Centage to Gross Receipts.
65,828	Merchandise ditto	11·847	... 24·00
10,360	General ditto	1·864	
237,315	Total Working Charges	42·708	
26,044	Rates, Taxes and Government Duty	4·687	
263,359	Total Expenses.....	47·395	

RECEIPTS.

	£	Per Centage to Gross Receipts.
Passengers, Parcels, Horses, Mails, &c. ...	272,248	48·996
Merchandise, Cattle, &c.	274,237	49·363
Sundries	9,114	1·641
	555,649	100·000
Total ordinary Expenditure.....	263,359	

Gross Receipts per Mile for the Half-year, £1332·5; ditto Expenditure, £655·54; Average Weekly Receipts per Mile, £51·25; ditto Expenditure, £25·21.

EAST LANCASHIRE RAILWAY.

Half-years ending December, 1850 and 1851.

GENERAL EXPENDITURE.

	Per Centage to Receipts.	
	1850	1851
Wages to Enginemen, Firemen, &c.	3·55	3·23
Coke	4·28	4·24
Oil, Tallow, Water, &c.	1·37	1·14
Repairs of Engines, &c.	3·59	3·34
Total Locomotive Power	12·79	11·95

COACHING CHARGES.

	Per Centage to Receipts.	
	1850	1851
Wages of Clerks, Guards, Porters, &c.	3·87	3·44
Station expenses, including gas	0·94	0·80
Oil, Tallow, Waste, &c.	0·37	0·39
Repairs of Carriages, &c.....	1·41	1·27
Clothing	0·20	0·19
Compensation	0·32	0·16
Total	<u>7·11</u>	<u>6·25</u>
Total Coaching and Locomotives...	<u>19·90</u>	<u>18·20</u>

MERCHANDISE CHARGES.

Wages of Clerks, Guards, Porters, &c.	7·20	6·91
Station expenses, including cartage, &c.....	3·64	4·57
Oil, Tallow, Waste, &c.	0·14	0·12
Repairs of Waggons, Sheets, &c.	2·23	2·14
Clothing	0·04	—
Compensation	0·29	1·08
Total	<u>13·54</u>	<u>14·82</u>
Gross Total	<u>33·44</u>	<u>33·02</u>
Maintenance of Way and Works.....	5·58	5·05
General Charges	3·17	2·92
Total Working Charges	<u>42·19</u>	<u>40·99</u>
Rates, Taxes, and Government Duty	4·08	3·73
Total Expenses.....	<u>46·27</u>	<u>44·72</u>

Total Receipts.....	£ 118,246
Total Expenditure	<u>52,877</u>

Half-year ending June, 1854.

MAINTENANCE OF WAY.

	Per Mile.
	£
Superintendence	3·244
Maintenance of Way	86·915
Repairs of Stations, Workshops, &c.	13·646
Total	<u>103·805</u>

GENERAL EXPENDITURE.

£		Per Centage to Receipts.
8,512	..... Maintenance of Way	6·28
15,649	..... Locomotive Power	11·54
5,052	..... Carriage and Waggon repairs, &c.	3·73
		Per Centage to Coaching Receipts.
6,194	..... Coaching Charges	4·57 ... 10·77
		Per Centage to Goods Receipts.
17,509	..... Merchandise ditto	12·91 ... 23·60
2,966	..... General ditto	2·19
55,882	..... Total Working Charges	41·22
3,171	{ Rates, Taxes, and Government }	2·34
	{ Duty	
59,053	..... Total Expenses	43·56

Half-year ending June, 1853, 43·44 per cent.; December, 1853; 45·26 per cent.

RECEIPTS.

£		Per Centage to Gross Receipts.
Passengers, Parcels, Mails, Horses, Carriages, } 57,485		42·41
and Dogs		
Goods, Minerals, and Cattle	74,297	54·81
Sundries	3,780	2·78
Gross Total Receipts	135,562	100·00
Ditto Expenditure	59,053	

Interest on Loans and Preference Shares, £38,587; Free Balance, £37,922.

Gross Receipts per Mile for the Half-year, £1653·30; Ditto Expenditure, £720·16. Average Receipts per Mile Weekly, £63·6; Ditto Expenditure, £27·7.

Half-year ending July, 1851.

	Per Mile. £
Maintenance of Way, Works, &c.	69·86
Locomotive Power per Train Mile ..	^{D.} 8·99

Half-year ending January, 1852.

GENERAL EXPENDITURE.

	Per Train Mile. D.	Per Centage to Receipts.
Maintenance of Way	3·777	6·20
Coaching Charges.....	3·197	5·25
Locomotive ditto	7·243	11·90
Goods ditto	4·479	7·36
Canal ditto and Glasgow Incline	1·158	1·90
General Charges	2·444	4·01
Law ditto	0·709	1·16
	<hr/>	<hr/>
	23·007	37·78
Rates, Taxes, and Government Duty	2·029	3·37
	<hr/>	<hr/>
	25·036	41·15
	<hr/>	<hr/>

	£
Total Receipts.....	100,403
Ditto Expenses	41,323
	<hr/>

EDINBURGH, PERTH, AND DUNDEE.

Half-year ending July, 1854.

MAINTENANCE OF WAY.

	Per Mile. £
Superintendence	1·81
Maintenance of Way	46·19
Repairs of Stations, Telegraphs, &c.	12·22
	<hr/>
Total.....	60·22
	<hr/>

LOCOMOTIVE DEPARTMENT.

Mileage—Passenger, 106,592; Goods, 146,000; Mixed Trains, 43,456; Total, 296,049 miles.

	Per Train Mile. D.
Superintendence	0·250
Wages to Enginemen, Firemen, and Cleaners	2·080
Coke and Coal	3·798
Oil, Tallow, and Waste	0·727
Water	0·263
	<hr/>
	7·118
Less received for Engine Power.....	0·392
	<hr/>
Net cost Engine Working	6·726
Repairs to Engines	2·516
	<hr/>
Total Engine Working and Repairs...	9·242
Carriage and Waggon Repairs	2·346
	<hr/>
Total Engines, Carriages, and Waggons	<u>11·588</u>

GENERAL EXPENDITURE.

£		Per Centage to Receipts.
4,697 ...	Maintenance of Way	6·189
9,727 ...	Locomotive Power	12·817
2,469 ...	Carriages and Waggon's	3·254
3,617 ...	Coaching Traffic Charges	4·766
5,440 ...	Goods ditto	7·168
12,535 ...	Ferries, Harbour, Pier Dues, Cartage, &c.....	16·517
2,489 ...	General Charges	3·280
		<hr/>
40,974 ...	Total Traffic Expenses	53·991
2,664 ...	Rates, Taxes, and Government Duty	3·484
		<hr/>
43,618 ...	Total Expenses.....	<u>57·475</u>

RECEIPTS.

	£	Per Centage to Gross Receipts.
574,249 Passengers, Parcels, &c.....	30,473	... 40·16
259,085 Tons Goods	44,318	... 58·39
Sundries	1,098	... 1·45
	<u>75,889</u>	<u>100·00</u>

Total Expenditure 43,618

Interest on Loans and Preference Shares ... £32,111

Total Receipts per Mile for the Half-year..... 972·94

Ditto Expenses ditto ditto 559·21

Average Receipts per Mile per Week 37·42

Ditto Expenses ditto ditto 21·51

	Per Train Mile. lbs.
Consumption of Coke Passenger Trains	14·76
Ditto Goods ditto	34·55
Ditto Mixed ditto	21·85
Average	<u>25·56</u>

GLASGOW AND SOUTH-WESTERN RAILWAY.

Half-year ending January, 1852.

	Per Mile. £
Maintenance of Way	52·25

GENERAL EXPENDITURE.

	Per Train Mile. d.	Per Centage to Receipts.
Maintenance of Way	1·196	4·76
Locomotive Power	6·270	15·63
Carriage and Waggon repairs	1·533	3·83
Renewal of Plant	1·059	2·64
Coaching Charges.....	1·110	2·76
Goods ditto	2·726	6·79
Police, &c.	0·190	0·47
Carried forward	<u>14·084</u>	<u>36·88</u>

	Per Train Mile. D.	Per Centage to Receipts.
Brought forward	14·084	36·88
General Charges	1·463	3·64
Law ditto	0·113	0·28
Joint Railway Charges and Rent at Carlisle	1·867	2·16
Total Working Charges	17·527	42·96
Rates, Taxes, and Government Duty	0·977	2·44
Total Expenses.....	18·504	45·40
<hr/>		
Total Receipts for the Half-year	£ 107,487	
Ditto Expenditure ditto	49,2·4	

GREAT NORTHERN RAILWAY.

Half-year ending December 31st, 1851.

	Per Mile. £
Maintenance of Way	99·62
Repairs of Stations, &c.	29·78
Total.....	129·40

LOCOMOTIVE POWER.

Mileage.—Passengers, 1,086,893; Goods, 823,213; Total Train Miles, 1,910,106; Piloting, &c., 105,789; Ballasting, 13,845; Total Engine Mileage, 2,029,740.

	Per Train Mile. D.
Enginemen and Firemen's Wages	1·319
Coke, Coal, and Coking	2·588
Oil, Tallow, and Sundry Small Stores	0·259
Cleaning and Lighting, Water, Pumping, &c.	0·534
Foremen, &c.	0·502
Labourers.....	0·109
Total cost Locomotive Working	5·311
Repairing Engines—Wages	0·852
„ Materials	0·803
Total Locomotive, working and repairing	6·966
Carriage and Waggon, repairs and renewals ...	1·155
Total cost Engines, Carriages, and Waggons	8·121

GENERAL EXPENDITURE.

	Per Train Mile. D.	Per Centage on Receipts.
Maintenance of Way	1·973	4·95
Locomotive Expenses	6·966	17·35
Repairs and Renewals of Carriages and Waggon }	1·155	2·91
Coaching Traffic Expenses	2·085	7·90
Goods ditto ditto	2·344	5·92
Mineral ditto ditto	0·830	2·10
General Charges	1·319	4·89
Law ditto	0·249	0·62
Total Working Charges	16·921	46·64
Rates, Taxes, &c.	1·233	3·11
Total Expenses.....	18·154	49·75

Total Receipts for the Half-year	£ 315,650
Ditto Expenses ditto	157,044

Half-year ending June 30th, 1854.

	Per Mile. £
Maintenance of Way.....	151·43

LOCOMOTIVE POWER.

Mileage—Passengers, 959,786 ; Goods, 1,465,798 ; Total Train Miles, 2,425,584 ; Piloting, &c., 88,282 ; Ballasting, &c., 73,392 ; Total Engine Mileage, 2,587,258.

	Per Train Mile. D.
Superintendence	0·509
Wages to Enginemen and Firemen	1·347
Ditto Cleaners, Cokemen, and Labourers	0·695
Coke and Coal	2·517
Oil, Tallow, Waste, and Small Stores.....	0·257
Carried forward	5·325

	Per Train Mile. D.
Brought forward :	5·325
Water	0·092
Total cost of Locomotive Working	5·417
Less work done for other departments ...	0·272
Net cost	5·145
Repairs.—Wages	0·954
Ditto Materials	1·147
Total cost of Locomotive Power	7·246
Carriage Repairs, including amount due to other Companies for use of Carriages	0·508
Waggon Repairs	1·332
Total Engines, Carriages, and Waggons	<u>9·086</u>

GENERAL EXPENDITURE.

£		Per Centage to Receipts.
42,856	Maintenance of Way	9·12
73,330	Locomotive Expenses	15·61
18,609	{ Carriage and Waggon re- pairs, &c. }	3·96
28,026	Coaching Traffic Charges	5·96
		Per Centage to Coaching Receipts. ... 10·00
41,437	Goods and Mineral ditto	8·82
1,473	Navigation Expenses	0·31
21,664	{ General Charges (including Clothing, Law Charges, Clear- ing, House Expenses, Tele- graph, &c.)	4·61
227,395	Total Working Expenses...	48·39
15,942	{ Rates, Taxes, and Government Duty	3·39
243,337	Total Expenses	<u>51·78</u>

RECEIPTS.

785,199 Passengers, producing (= 50d. each).....	} £ 163,663	
Parcels, Horses, Carriages, and Mails ...		22,488
Total.....	186,171	... 39·62
Goods, Minerals, and Cattle	269,761	... 57·40
Sundries	14,011	... 2·98
Total Receipts.....	469,943	
Ditto Expenditure	243,337	
Total Receipts per Mile for the Half-year, £1660·6; Ditto Expenditure, £859·85; Average Receipts per Mile Weekly, £63·85; Ditto Expenditure ditto, £33·07.		

GREAT WESTERN RAILWAY.

Half-year ending December 31st, 1851.

	Per Mile.
	£
Maintenance of Way.....	252·42

LOCOMOTIVE POWER.

Mileage—Passenger, 872,745; Goods, 186,236; Total Train Miles, 1,058,981; Piloting, Assisting, &c., 76,818; Total Engine Miles, 1,135,799.

	Per Train Mile.
	D.
Wages to Enginemen and Firemen	1·505
Oil, Tallow, Waste, Water, and Firewood... ..	0·389
Labourers and Cleaners' Wages.....	0·564
Superintendence	0·415
Coke and Coal.....	4·345
Sundries	0·111
Total cost of Working	7·329
Repairs	3·185
Total cost Locomotive Power.....	10·514
Carriage and Waggon repairs.....	2·957
Total Engines, Carriages, and Waggon	<u>13·771</u>

	£
Total Receipts for the Half-year	591,574
Ditto Expenditure ditto	<u>175,084</u>

Half-year ending June 30th, 1854.

	Per Mile.
	£
Maintenance of Way.....	<u>201·33</u>

GENERAL EXPENDITURE.

£		Per Centage to Receipts.
64,526	... Maintenance of Way	10·399
56,697	... Locomotive Expenses	9·131
25,599	... Carriages and Waggon's	4·123
73,830	... Coaching and Merchandise Charges	11·891
14,817	{ General Charges, including Compensation, Parliamentary and Law Charges, &c..... }	2·386
235,469	... Total Working Charges	37·930
27,149	... Rates, Taxes, and Government Duty	4·372
262,618	... Total Expenses	<u>42·302</u>

RECEIPTS.

	£	Per Centage to Gross Receipts.
Passengers	343,521	
Carriages, Horses, Dogs, Mails, and Parcels ..	<u>41,540</u>	
Total.....	385,061	62·02
Goods, Minerals, and Cattle	207,478	32·41
Sundries	<u>28,349</u>	5·57
Total.....	<u>620,888</u>	

Gross Receipts per Mile for the Half-year, £1946·04; Ditto Expenditure, £823·26; Average Weekly Receipts ditto, £75·00; Ditto Expenditure ditto, £31·66.

LANCASHIRE AND YORKSHIRE RAILWAY.

Half-year ending June 30th, 1851.

	Per Mile. £
Maintenance of Way	65·14
Repairs of Stations, &c.	17·87
Superintendence	4·91
Total.....	<u>87·92</u>

LOCOMOTIVE POWER.

Mileage—Passengers, 799,721; Goods, 856,296; Total, 1,656,017

	d.	Per Train Mile.
Superintendence, Wages to Enginemen, Fire- men, &c.	2·074	2·074
Coke, Coals, Firewood, and Water	3·058	3·058
Oil, Tallow, Waste, and Small Stores	0·564	0·564
Total cost Working.....	5·696	5·696
Repairs.....	2·194	2·194
Total cost of Locomotive Power ...	<u>7·890</u>	<u>7·890</u>

Half-year ending June 30th, 1854.

	Per Mile. £
Superintendence of Permanent Way	5·24
Maintenance ditto	69·01
Repairs to Stations, &c.	13·68
Total.....	<u>87·93</u>
Less received from Blackburn Company...	6·59
Net cost	<u>81·34</u>

GENERAL EXPENDITURE.

£		Per Centage on Receipts.
19,849 ...	Maintenance of Way	4·045
56,851 ...	Locomotive Expenses.....	11·585
17,656 ...	Carriages and Waggon.....	3·597
24,897 ...	Coaching Traffic Expenses.....	5·073
57,659 ...	Goods and Cattle	11·750
<u>176,912</u> ...	Carried forward.....	<u>36·050</u>

STATISTICS.

51

£		Per Centage on Receipts.
176,912	Brought forward	36·050
11,628	... General Charges (including Canal Expenses)	2·369
15,716	{ Expenses of Working Blackburn and Preston } and Wyre Lines	3·202
204,256	... Total Working Charges	41·621
12,551	... Rates, Taxes, and Government Duty	2·549
216,807	... Total Expenses	44·170

RECEIPTS.

	£	Per Centage to Gross Receipts.
2,806,514 Passengers, Mails, Parcels, &c.	182,212	... 37·13
1,235,201 Tons Goods, and Cattle.....	278,301	... 56·71
Sundries	30,228	... 6·16
	490,741	
Total Expenditure	216,807	

Total Receipts per Mile for the Half-year, £2011·23; Ditto Expenses, £888·55; Average Receipts Weekly, 77·36; Ditto Expenses ditto, 34·18

Half-year ending December 31st, 1854.

PERMANENT WAY.

	Per Mile. £
Superintendence	5·328
Maintenance of Way	72·956
Stations, Workshops, &c.	19·260
Total	£97·544

LOCOMOTIVE EXPENSES.

Mileage—Passenger, 931,356; Goods, 830,147; Total Train Miles, 1,761,503; Piloting, Assisting, and Ballasting, 465,655; Total Engine Miles, 2,227,158.

	Per Train Mile. D.
Superintendence and Wages to Enginemen and Firemen	2·182
Coke (at 12s. 6d. per Ton) Coal, and Firewood	3·228
Oil, Tallow, and Waste	0·431
Water	0·148
Hoisting and Pumping Engines	0·199
Small Stores and Gas	0·110
Total Cost of Loco. Working	6·298
Less Work done for Contractors, &c.	1·748
Net Cost of Working	4·550
Repairs	2·460
Total Loco. Working and Repairing ...	7·010
Carriage Repairs	0·996
Waggon Ditto	1·165
Total Engines, Carriages, and Waggon	9·171

GENERAL EXPENDITURE.

£		Per Centage to Receipts.
24,679	Permanent Way	4·56
51,428	Locomotive Expenses	9·53
15,861	Carriage and Waggon Repairs	2·93
19,046	Coaching Traffic Expenses	3·52
61,085	Goods Traffic Charges	11·28
3,492 } 1,092 }	Compensation and Canal Charges	0·84
16,814	Preston and Wyre, and Blackburn Railway Ex- penses	3·11
10,144	General Charges	1·87
203,641	Total Working Expenses	37·64
18,637	Rates, Taxes, and Government Duty	3·44
222,278	Total Expenses	41·08

RECEIPTS.

	£	Per Centage to Gross Receipts.
Passengers, Parcels, and Mails	204,187	37·72
Goods and Cattle.....	303,535	56·08
Sundries	33,494	6·20
	<u>541,216</u>	<u>100·00</u>

	£
Gross Receipts per Mile for the Half-year ...	2143·1
Ditto Expenses ditto.....	878·6
Average Weekly Receipts per Mile.....	82·4
Ditto ditto Expenses ditto	33·8

LANCASTER AND CARLISLE RAILWAY.

Half-year ending January 31st, 1852.

	Per Mile. £
Maintenance of Way	165·04

GENERAL EXPENDITURE.

	Per Centage to Receipts.
Maintenance of Way	5·69
Locomotive Expenses (contract)	19·19
Coaching Traffic Expenses	5·07
Goods ditto ditto.....	6·91
General Expenses	3·33
Total Working Expenses	<u>40·19</u>
Rates, Taxes, and Government Duty.....	2·69
Total Expenses	<u>42·88</u>
Total Receipts for the half-year	£130,416
Ditto Expenses ditto	<u>£55,926</u>

LONDON, BRIGHTON, AND SOUTH COAST.

1845.

GENERAL EXPENDITURE.

	Per Centage to Receipts.
Maintenance of Way, &c.	5·18
Locomotive Working	9·05
Ditto Repairing.....	2·92
Carriage and Waggon Repairs	3·26
Coaching Traffic Expenses	5·74
Goods ditto ditto	2·39
Office and General Charges.....	4·06
Tolls.....	15·70
 Total Working Charges	 48·30
Rates, Taxes, and Government Duty.....	7·55
 Total Expenses	 <u>55·85</u>

Half-year ending June 30th, 1854.

MAINTENANCE OF WAY.

£		Per Mile. £
971	Superintendence ..	6·075
10,549	Maintenance of Way	66·037
4,360	Renewals	27·295
4,169	Repairs of Stations, Slips of Earthwork, &c....	26·099
<u>20,049</u>	Total	<u>£125·506</u>

LOCOMOTIVE POWER.

	Per Train Mile.
Mileage:—Passenger, 593,382; Goods, 304,852; Total 898,234	
Piloting and Light Running, 263,701; Ballasting, } 60,360.....	324,061
Total Engine Mileage	<u>1,222,295</u>

Total Cost for Half-year.		Per Train Mile. D
523	Superintendence	0·139
8,031	Wages to Enginemen, Firemen, &c.	2·146
3,613	Oil, Tallow, Waste, Water, &c.	0·965
15,266	Coke and Coals (11,969 Tons)	4·079
27,433	Total Cost of Working	7·329
6,070	Repairs to Engines, Wages	1·622
4,754	Ditto ditto Materials.....	1·270
2,904	Renewals, Wages	0·776
3,183	Ditto Materials.....	0·850
£44,343	Total Cost of Locomotive Power	11·847
172	Carriages & Waggon, Superintendence	0·046
5,850	Ditto Repairs, Wages	1·563
4,091	Ditto ditto Materials	1·093
1,153	Ditto Renewals, Wages	0·308
2,148	Ditto ditto Materials	0·574
£13,444	Total Engines, Carriages, and Waggon.....	15·431

Average Consumption of Coke per Train Mile 29·85lbs.; per Engine Mile, 21·93lbs.

GENERAL EXPENDITURE.

£		Per Centage to Receipts.
20,049	..... Maintenance of Way	6·291
44,343	..... Locomotive Expenses.....	13·914
13,414	..... Carriage and Waggon repairs	4·209
		Per Centage to Coaching Receipts.
26,725	..... Coaching Traffic Charges	8·386 ... 11·303
		Per Centage to Goods Receipts.
17,914	..... Goods ditto ditto	5·621 ... 23·484
4,385	..... General and Law ditto	1·175
126,830	..... Total Expenses of Working	39·596
20,503	{ Rates, Taxes and Government } Duty	6·433
147,333	..... Total Expenses.....	46·029

RECEIPTS.

Per Centage to
Gross Receipts.

74.189	{	2,669,311 Passengers, pro-	} 209,804 = $\frac{£}{d.}$ 18.86	per passenger.
		ducing		
	{	Horses, Mails, Parcels, and	} 26,632	
		Season Tickets		
23.936	{	291,502 tons Merchandise ...	74,611	= $\frac{d.}{£}$ 61.43
		Cattle.....	1,672	per ton.
1.875	.....	Sundries.....	5,975	
			318,694	

Total Expenditure £147,333

Gross Receipts per Mile for the Half-year, £1991.84; ditto Expenditure, £920.83; Average Receipts Weekly, £76.62; ditto Expenditure, £35.42.

LONDON AND NORTH-WESTERN.

Half-year ending November, 1851.

MILEAGE.

	Southern Division.	Northern Division.	Manc. & Birm. Division.
Passenger Trains	1,336,409	1,424,343	368,581
Goods ditto	605,040	1,186,312	180,106
Total Train Miles	1,941,449	2,610,655	548,687
Piloting and Assisting Pas- senger Trains	} 134,055	50,834	16,889
Ditto ditto Goods ditto...			
	80,538	101,884	7,961
Total Engine Miles	2,156,042	2,763,373	573,537
Total Engine Miles	} 1,853,342	2,489,486	.....
Half-year ending			
May, 1851			

LOCOMOTIVE EXPENSES.

	Southern Division. Per Train Mile. D.	Northern Division. Per Train Mile. D.	Manc. & Birm. Division. Per Train Mile. D.
Coke	5.13	2.73	3.26
Wages to Enginemen and Firemen, &c.}	1.76	1.36	1.18
Oil and Tallow	0.27	0.16	0.26
Repairs	2.55	2.05	1.67
General Charges	1.46	1.05	1.28
	<hr/> 11.17	<hr/> 7.35	<hr/> 7.65
Cost of Coke per ton.....	<hr/> 20s. 2½d.	<hr/> 14s. 6¾d.	<hr/> 14s.
Cost of Power per Pas- senger Train Mile.....}	D. 10.36	D. 6.48	.....
Ditto Goods ditto	13.70	9.82	.....
	<hr/> lbs.	<hr/> lbs.	<hr/> lbs.
Consumption of Coke per Passenger Train Mile...}	36.29	26.80	31.89
Ditto Goods ditto	58.44	43.65	51.89
	<hr/>	<hr/>	<hr/>

Half-year ending June 30th, 1854.

PERMANENT WAY.

	Per Mile. £
Superintendence	7.064
Maintenance of Way.....	67.495
Renewals	38.950
Stations, Signals, &c.	25.642
Total per mile	<hr/> 139.151

GENERAL EXPENDITURE.

£		Per Centage to Receipts.
78,203	Maintenance of Way	5·550
191,094	Locomotive Expenses.....	13·561
54,196	Carriage and Waggon repairs...	3·846
		Per Centage to Coaching Receipts.
92,864	Coaching Traffic Charges	6·590 ... 13·18
		Per Centage to Goods Receipts
146,943	Merchandise ditto	10·428 ... 23·5
23,482	General Charges	1·666
586,782	Total Working Charges ...	41·641
54,221	{ Rates, Taxes, and Government } Duty	3·848
641,003	Total Expenses	45·489

Note.—The wages to pointsmen and policemen, and charges for compensation for losses, law expenses, and expense of schools at Wolverhampton and Crewe, are divided between coaching and merchandise charges, in proportion to their respective amounts.

RECEIPTS.

	£	Per Centage to Gross Receipts.
9,928,376 Passengers, Mails, Parcels, } Horses, Carriages, and Dogs	704,543	... 50·00
Merchandise, Coal (4,453,698 tons), and } Cattle	625,585	... 44·39
Sundries (Rents, Dividends, &c.)	79,000	... 5·61
Total	1,409,128	
Total Expenditure	641,003	
Gross Receipts per mile for the half-year ...	£2507·35	
Ditto Expenses ditto	1140·60	
Average Receipts per mile per week	96·44	
Ditto Expenses ditto	43·9	

LONDON AND SOUTH-WESTERN.

Half-year ending December 31st, 1852.

PERMANENT WAY.

	Per Mile. £
Superintendence	3·57
Maintenance of Way	110·16
Stations	14·96
	<hr/>
Total.....	128·69
	<hr/>

LOCOMOTIVE EXPENSES.

Mileage.—Passenger Trains, 943,529; Goods, 182,968; Total Train Miles, 1,126,497; Piloting, 27,874; Total Engine Mileage, 1,154,371.

	Per Train Mile. D.
Superintendence	0·158
Wages to Enginemen and Firemen	1·449
Coke and Coal.....	2·909
Wages to Mechanics, Cleaners, &c.....	2·268
Materials for Repairs and Working	2·301
	<hr/>
Total cost Locomotive Working and Repairs	9·085
Carriage and Waggon repairs.....	2·278
	<hr/>
Total Engines, Carriages, and Waggons	11·363
Traffic and General Charges	10·043
Rates, Taxes, and Government Duty.....	4·695
	<hr/>
Total Expenses per mile	26·101
	<hr/>

GENERAL EXPENDITURE.

	Per Centage to Receipts.
Maintenance of Way	4.12
Locomotive Expenses	11.39
Carnage and Waggon Repairs	2.85
Traffic Charges	10.38
General ditto	2.71
Total Working Charges	31.45
Rates, Taxes, and Government Duty	5.36
Total Expenses	36.81
<hr/>	
Total Receipts for the Half-year	£ 377,550
Ditto Expenses ditto	138,029

Half-year ending June 30th, 1854.

PERMANENT WAY.

	Per Mile. £
Superintendence	1.520
Maintenance of Way	63.960
Renewals	29.992
Stations	14.184
Total	£109.656

LOCOMOTIVE EXPENSES.

Mileage—Passengers, 884,682½; Goods, 292,246½; Total Train Mileage, 1,176,929; Piloting, &c., 22,153; Total Engine Mileage, 1,199,082. Average consumption of Coke per Train Mile, 20.7 lbs.

	Per Train Mile. d.
Superintendence	0.148
Coke and Coal	3.441
Wages to Enginemen and Firemen	1.505
Firemen, Cleaners, and Labourers	0.469
Carried forward	5.563

	Per Train Mile. D.
Brought forward ...	5·563
Water, Cokemen, &c.	0·344
Oil, Tallow, Waste, and Packing	0·264
Total Locomotive Working	6·171
Repairs—Wages, 1·181; Materials, 1·628 ...	2·809
Total Locomotive Power.....	8·980
Carriage and Waggon Repairs	2·123
Total.....	<u>11·103</u>

GENERAL EXPENDITURE.

£		Per Centage to Receipts.
27,415	Permanent Way	7·887
44,062	Locomotive Expenses	12·676
10,310	Carriage and Waggon Repairs	2·969
47,761	Traffic Charges	13·740
8,495	General ditto.....	2·444
138,043	Total Working Charges	39·716
21·125	Rates, Taxes and Government Duty ...	6·077
159,168	Total Expenses.....	<u>45·793</u>

RECEIPTS.

	£	Per Centage to Gross Receipts.
Passengers, Mails, Horses, &c.	252,936	72·78
Goods and Cattle	87,729	25·24
Sundries	6,886	1·98
	<u>£347,601</u>	

Gross Receipts per Mile for the Half-year, £1390·4; Ditto Expenses ditto, £636·67; Average Receipts per Mile per Week, £53·5; Ditto Expenses ditto, £24·45.

MANCHESTER, SHEFFIELD, AND LINCOLN-SHIRE RAILWAY.

Half-year ending June, 1854.

PERMANENT WAY.

	Per Mile.
	£
Superintendence	3·809
Maintenance of Way	49·143
Renewals	24·107
Stations	21·453
Total.....	<u>98·512</u>

LOCOMOTIVE EXPENSES.

Mileage—Passenger Trains, 528,276; Goods do., 507,431; Total Train Miles, 1,035,707; Piloting, Ballasting, &c., 199,509; Total Engine Mileage, 1,235,216.

	Per Train Mile.
	D.
Wages to Enginemen, Firemen, Nightmen, and } 2·515	
Cleaners	
Coke, Coal, and Firewood	3·664
Oil, Tallow, Waste, &c.	0·583
Total Locomotive Working	<u>6·762</u>
Repairs :—Wages, 1·106; Materials, 1·819 ...	2·925
Total Working and Repairing	<u>9·687</u>
Less amount received for work done.....	<u>1·112</u>
Net cost Locomotive Power	8·575
Carriage Repairs and Waggon Repairs.....	<u>2·598</u>
Total Engines, Carriages, and Waggons	<u>11·173</u>

MIDLAND RAILWAY.

Half-years ending June 30th, 1851.

PERMANENT WAY.

	Per Mile.
	£
Maintenance of Way	124·34
Stations	8·60
Total.....	<u>132·94</u>

LOCOMOTIVE EXPENSES.

	Per Train Mile.
	d.
Working (Exclusive of Oil and Tallow) and Repairing Engines	} 8·34
Ditto ditto Carriages and Waggon's	
Total per Train Mile	<u>12·32</u>

Half-year ending December 31st, 1851.

	Per Mile.
	£
Maintenance of Way and Stations	146·85

GENERAL EXPENDITURE.

	Per Train Mile. d.	Per Centage to Receipts.
Maintenance of Way and Stations	3·285	5·55
Locomotive Power	8·389	14·18
Coaching Traffic Expenses	2·685	4·54
Repairs and Renewals of Stock	1·540	2·60
Goods Traffic Charges	3·588	5·89
Compensation for Law Charges and Rents	1·744	2·95
Oil and Tallow	0·616	1·03
General Charges	0·747	1·25
Total Working Charges	<u>22·594</u>	<u>37·99</u>
Rates, Taxes, and Government Duty	1·988	3·37
Total Expenses.....	<u>24·582</u>	<u>41·36</u>

Total Receipts, £655,763; ditto Expenditure, £271,289; Total Train Miles run, 2,660,422.

Half-year ending June 30th, 1854.

PERMANENT WAY.

	Per Mile. £
Superintendence	3·447
Maintenance of Way	55·623
Stations	11·866
Renewals	30·060
Total	<u>100·996</u>

GENERAL EXPENDITURE.

£		Per Centage to Receipts.
50,397	Maintenance of Way	7·337
124,221	Locomotive Expenses	18·122
20,629	Carriage and Waggon repairs	3·009
6,250	Renewals of Rolling Stock	0·910
95,370	Traffic Charges	13·912
14,784 {	General ditto, including Law and Parlia- mentary Expenses	2·171
311,651	Total Working Charges.....	<u>45·461</u>
21,134	Rates, Taxes, and Government Duty ...	3·028
332,785	Total Expenses	<u>48·489</u>

RECEIPTS.

	£	Per Centage to Gross Receipts.
Passengers, Horses, Carriages, Dogs, } Mails and Parcels	272,709	39·61
Merchandise and Minerals.....	397,432	57·72
Sundries	18,382	2·67
	<u>688,523</u>	<u>100·00</u>

Gross Receipts per Mile for the Half-year, £1379·8; ditto Expenses ditto, £667·0; Average Weekly Receipts per Mile, £53·0; ditto Expenses, £25·6.

MIDLAND GREAT WESTERN RAILWAY.

Half-year ending December 31st, 1851.

GENERAL EXPENDITURE.

	Per Centage to Receipts.
Maintenance of Way	4·04
Locomotive Expenses	22·92 (Contract.)
Traffic Charges	6·36
Management	2·02
General Charges	4·27
Total Working Charges	39·61
Rates, Taxes and Government Duty	0·13
Total Expenses	39·74
<hr/>	
Total Receipts for the Half-year	£ 33,422
Ditto Expenses ditto	13,284

NORTH BRITISH RAILWAY.

Half-year ending January, 1852.

	Per mile. £
Maintenance of Way	135·30

GENERAL EXPENDITURE.

	Per Train Mile. D.	Per Centage to Receipts.
Locomotive Expenses	6·514	18·63
Coaching Traffic ditto	2·131	6·09
Goods ditto ditto	2·835	8·11
Maintenance of Line and Stations	3·666	10·48
General Expenses	0·811	2·32
Total Working Expenses	15·957	45·63
Rates, Taxes, and Government Duty	1·843	5·27
	<hr/> 17·800	<hr/> 50·90

Half-year ending July, 1854.

PERMANENT WAY.

	Per Mile. £
Maintenance of Way	53·322
Renewals	37·732
Stations	8·389
Total	<u>99·443</u>

LOCOMOTIVE EXPENSES.

Mileage—Passenger Trains, 263,269; Goods ditto, 214,207; Total Train Miles, 477,476; Piloting, &c., 118,799; Total Engine Mileage, 596,275.

	Per Train Mile. D.	
Superintendence	0·226	
Enginemen, Firemen, Cleaners, and Cokemen	1·878	
Lampmen, Pointmen, Pumpmen, Watchmen, and Shedmen	0·399	
Coke and Coal.....	4·199	
Oil, Tallow, and Waste	0·570	
Water and Sundries	0·198	
Total Locomotive Working	7·470	
Repairs, Wages and Materials	3·377	
Total Locomotive Working and Repairing	10·847	
Cr. By Ballasting	0·153	
Net Cost	10·694	
		Per Passenger Train Mile. D.
Repairs and Renewals of Carriages	1·552	= 2·81
		Per Goods Train Mile. D.
Ditto ditto Waggon's	2·008	= 4·48
Total Engines, Carriages, and Waggon's	14·254	

GENERAL EXPENDITURE.

£		Per Centage to Receipts.
14,818	Maintenance of Way.....	12·891
21,273	Locomotive Expenses	18·507
		Per Centage to Coaching Receipts.
4,767	Coaching Traffic Charges.....	4·147 9·97
		To Goods Receipts.
7,122	Goods ditto	6·195 10·98
7,082	Carriage and Waggon Repairs	6·161
4,746	General Charges	4·129
59,808	Total Working Charges	52·030
5,251	Rates, Taxes, and Government Duty...	4·568
3,562	Extraordinary Expenditure	3·099
68,621	Total Expenses.....	59·697

RECEIPTS.

	£	Per Centage to Gross Receipts.
Passengers, Horses, Carriages and Mails ...	47,819	41·60
Goods, Cattle, &c.	64,845	56·41
Sundries	2,282	1·99
	£114,946	100·00
Total Expenses	68,621	

Gross Receipts per Mile for the Half-year	771·45
Ditto Expenses do. do.	460·50
Average Receipts per Mile per Week.....	29·67
Ditto Expenses do. do.	17·71

NORTH EASTERN.

(YORK AND NORTH MIDLAND.)

Half-year ending June 30th, 1851.

	Per Mile.
	£
Maintenance of Way, Stations, &c.....	69·96
	Per Train Mile.
	d.
Cost of Locomotive Power	7·407
Ditto Coke	2·219
Consumption of Coke	35·51lbs.

(YORK, NEWCASTLE AND BERWICK.)

	Per Mile.
	£
Maintenance of Way	147·72

LOCOMOTIVE EXPENSES.

PASSENGER TRAINS.

	Per Train Mile.
	d.
Coke and Coal (29·47lbs. per mile)	1·38
Other Expenses	3·43
Total Cost of Locomotive Working	4·81
* Repairs and Renewals.....	3·42
Total.....	<u>8·23</u>

GOODS TRAINS.

Coke and Coal (52·85lbs. per mile).....	2·47
Other Expenses.....	1·86
Total Cost of Locomotive Working	4·33
Repairs and Renewals.....	3·36
Total.....	<u>7·69</u>
Average Cost Locomotive Working and Repairs	7·91
Carriage and Waggon Repairs.....	2·80
Total.....	<u>10·71</u>

Half-year ending December 31st, 1851.

(YORK AND NORTH MIDLAND.)

PERMANENT WAY.

	Per Mile.
	£
Superintendence	5·257
Maintenance of Way.....	57·085
Stations	11·071
Total.....	<u>£73·413</u>

LOCOMOTIVE EXPENSES.

Total Train Miles, 1,012,337; Consumption of Coke per mile, 30·91lbs.

	Per Train Mile.
	D.
Superintendence	0·116
Coke and Coal.....	1·844
Oil, Tallow, Waste, and Sundries	0·592
Wages to Enginemen, Firemen, &c.	1·558
Total Cost of Locomotive Working	<u>4·110</u>
Repairs—Wages, 1·501; Materials, 0·922 ...	<u>2·423</u>
Total Cost Locomotive Working and Repairing.....	<u>6·533</u>
Repairs and Renewals of Carriages and Waggon	<u>1·279</u>
Total.....	<u>7·812</u>

Total Receipts, £238,547; Total Expenses, £88,392; Working Expenses, 32·86 per cent.

Mileage — Passenger Trains, 641,032; Goods and Mineral, 1,129,474; Total Train Miles, 1,770,506.

	Per Train Mile.
	D.
Superintendence	0·066
Coke and Coal	1·917
Wages to Enginemen and Firemen	1·291
Oil, Tallow, Waste, &c.	0·370
Firemen, Cleaners, Water, &c.	0·553
Total cost of Locomotive Working	4·202
Repairing.....	3·386
Total Locomotive Working and Repairing	<u>7·588</u>

GENERAL EXPENDITURE.

	Per Train Mile. Passengers.	Per Train Mile. Goods.	Per Centage to Receipts.
	D.	D.	
Maintenance of Way and Stations ...	2·951	2·951	5·43
Locomotive Expenses	8·391	7·133	13·95
Carriage and Waggon ditto.....	1·682	3·389	5·09
Coaching Charges	3·364	1·909	4·48
Goods ditto	—	3·642	4·27
Police and Watchmen	0·421	0·239	0·58
Way leaves	1·068	1·244	2·17
General Charges	2·197	1·247	2·96
Total Working Charges ...	<u>20·074</u>	<u>21·754</u>	<u>38·93</u>
Rates, Taxes, and Government Duty	2·635	1·076	3·06
Total Expenses.....	<u>22·709</u>	<u>22·830</u>	<u>41·99</u>

Total Receipts, £401,091 ; Total Expenses, £168,097.

Half-year ending June, 1854.

PERMANENT WAY.—(AMALGAMATED LINES.)

	Per Mile. £
Superintendence	3·408
Maintenance of Way	52·392
Stations	9·557
Total	<u>£65·357</u>

LOCOMOTIVE EXPENSES.

Train Miles run 3,861,315.

	Per Train Mile. D.
Superintendence	0·052
Firemen and Cleaners	0·394
Wages to Engineers and Firemen	1·228
Water, Pumpsmen, Cokemen, and Repairs to Coke and Water Stations	0·280
Coke and Coal	2·151
Oil, Tallow, Waste, Hemp, &c.	0·497
Total Cost of Locomotive Working	4·602
Repairs and Renewals	3·223
Total Locomotive Working and Repairing	7·825
Cr. by Malton and Driffield	0·066
Net Cost Locomotive Power	7·759
Carriage and Waggon Working	0·579
Carriage Repairs, 0·533 ; Waggon ditto, 2·253	=2·786
Total Engines, Carriages, and Waggons	11·124

GENERAL EXPENDITURE.

£		Per Centage to Receipts.
44,573	... Maintenance of Way	6·009
124,796	... Locomotive Expenses	16·823
54,142	... Carriage and Waggon Repairs	7·297
72,049	... Traffic Charges	9·713
12,150	... General ditto	1·638
26,410	... Stationary Engines, Shipping Expenses, &c.	3·560
334,120	Total Working Charges	45·040
31,473	... Rates, Taxes, and Government Duty	4·243
365,593	Total Charges	49·283

RECEIPTS.

	£	Per Centage to Gross Receipts.
2,908,543 Passengers (=17·53d. each) ...	212,486	35·46
Mails, Parcels, Horses, Dogs, Carriages, &c. ...	50,537	
Goods and Cattle	472,824	63·74
Sundries	5,954	0·80
	<u>741,801</u>	<u>100·00</u>
Total Expenses	<u>365,593</u>	

	£
Total Receipts per mile for the half-year ...	1087·68
Ditto Expenses ditto ditto ...	536·06
Average Receipts per mile, weekly	41·82
Ditto Expenses ditto ditto	20·62

SCOTTISH CENTRAL RAILWAY.

Half-year ending December, 1851.

GENERAL EXPENDITURE.

	Per Train Mile. D.	Per Centage to Receipts.
Permanent Way	4·939	11·27
Locomotive Carriage and Waggon Expenses	7·560	17·53
Coaching Traffic Expenses	1·866	4·19
Merchandise ditto	1·586	3·61
General Charges	2·870	6·54
Total Working Expenses.....	<u>18·821</u>	<u>43·14</u>
Rates, Taxes and Government Duty	0·932	2·12
Total Expenses.....	<u>19·753</u>	<u>45·26</u>

Receipts, £47,332. Expenses, £21,413.

Half-year ending June, 1854.

Maintenance of Way per Mile..... £ 113·16

GENERAL EXPENDITURE.

£		Per Centage to Receipts.
5,658	... Permanent Way Expenses	9·576
10,107	... Locomotive Carriage and Waggon ditto ...	17·106
2,057	... Coaching Traffic Expenses.....	3·481
2,649	... Goods ditto	4·484
4,122	... General (including law) ditto	6·976
24,593	... Total Working Charges.....	41·623
1,959	... Rates, Taxes and Government Duty	3·316
26,552	... Total Expenses	44·939

RECEIPTS.

	£	Per Centage to total Receipts.
272,840 Passengers (=20d. each)	22,775	46·20
Horses, Carriages, Parcels, and Mails.....	4,523	
172,240 Tons Goods (=40·4d. per ton) } Cattle, &c.....	31,254	52·89
Rents and Sundries.....	533	0·91
Total.....	59,085	100·00

Total Receipts per Mile for the Half-year	£ 1181·70
Ditto Expenses ditto ditto	531·04
Average Receipts per Mile Weekly	45·45
Ditto Expenses ditto ditto	20·42

SOUTH EASTERN.

Half-year ending December, 1851.

PERMANENT WAY.

	Per Mile. £
Maintenance of Way	120·10
Stations	7·14
Total	127·24

LOCOMOTIVE EXPENSES.

Mileage—Passenger Trains, 933,488; Goods Trains, 234,242; Total Train Miles, 1,227,730; Piloting, &c., 109,801; Total Engine Miles, 1,337,531.

Coke, per Train Mile Passenger, 22·14 lbs., cost 2·21d.; Goods, 34·29 lbs., cost 3·43d.

	Per Train Mile.
	^{D.}
Wages to Enginemmen and Firemen	1·581
Cleaners, Fire lighters, and Cokemen	0·421
Oil, Tallow, Waste, and Grease.....	0·427
Coke, at 18/8 per ton.....	2·532
Water	0·220
	<hr/>
Total cost of Working	5·181
Repairs of Engines and Tenders.....	2·193
Renewals ditto	0·851
	<hr/>
Total Working and Repairing	8·225
Carriage Repairs, 1·266d.; Waggon ditto, 0·647	1·913
Renewals.....	0·630
General Superintendence	0·218
	<hr/>
Total	10·986
	<hr/>

GENERAL EXPENDITURE.

	Per Train Mile.	Per Centage to Receipts.
	^{D.}	
Maintenance of Way and Stations	2·749	3·46
Locomotive Expenses	8·227	10·65
Carriage and Waggon ditto	2·762	3·21
Miscellaneous Working Expenses.....	13·128	16·55
Reserve Fund for Renewal of Way	1·189	1·50
	<hr/>	<hr/>
Total Working Expenses	28·055	35·37
Rates, Taxes, and Government Duty	6·305	7·95
	<hr/>	<hr/>
Total Expenses	34·360	43·32
	<hr/>	<hr/>

Receipts, £405,708. Expenditure, £175,769.

Half-year ending June, 1854.

PERMANENT WAY.

	Per Mile.
Maintenance of Way.....	86·657
Stations	12·739
Total	<u>99·396</u>

LOCOMOTIVE EXPENSES.

Mileage—Passengers, 1,052,651; Goods, 295,421; Total Train Miles, 1,348,072; Piloting, &c., 122,281; Total Train Miles, 1,470,353.

	Per Train Mile.
Wages to Enginemen and Firemen	1·568
Cleaners, Firelighters, and Cokemen	0·569
Coke (16·212 Tons)	3·275
Oil, Tallow, and Grease	0·257
Water	<u>0·247</u>
Total Cost of Working	5·916
Repairs, 2·065d.; Renewals, 1·126d.	<u>3·191</u>
Total Working and Repairing.....	9·107
Carriage Repairs, 1·076d.; Waggon do. 0·747d.	1·823
Ditto, and Waggon Renewals	0·987
Superintendence	<u>0·226</u>
Total	<u>12·143</u>

GENERAL EXPENDITURE.

£		Per Centage to Receipts.
26,936 ...	Permanent Way	6·251
51,148 ...	Locomotive Expenses	11·877
17,058 ...	Carriage and Waggon Repairs	3·951
		Per Centage to Coaching Receipts.
32,512 ...	Coaching Traffic Charges.....	7·545 ... 9·790
<u>127,654</u>	Carried forward.....	<u>29·624</u>

			Per Centage to Goods Receipts.
127,654	... Brought forward	29,624	
34,086	... Goods ditto ditto.....	7,910	... 37.465
15,451	... General Charges	3,586	
177,191	... Total Working Charges...	41,120	
31,998	{ Rates, Taxes, and Government Duty	7,427	
209,189	... Total Expenses	48,547	

RECEIPTS.

	£	Per Centage to Total Receipts.
4,051,984 Passengers (= 18.06 each)	304,973	
Carriages, Horses, Parcels, Mails, &c.	27,079	} 77.06
Cattle and Goods	90,982	21.11
Sundries.....	7,878	1.83
	<u>430,912</u>	<u>100.00</u>

Expenditure (exclusive of Reserve)
Fund for Permanent Way) } 209,189

Total Receipts per Mile for the Half-year ...	£ 1590.08
Ditto Expenses ditto ditto ...	771.92
Average Receipts ditto Weekly	61.15
Ditto Expenses ditto ditto	29.69

Half-year ending January, 1855.

PERMANENT WAY.

	Per Train Mile. d.	Per Mile maintained. £
Maintenance of Way	3.588	70,897
Stations	0.732	14,386
Renewals	2.656	52,189
	<u>6.976</u>	<u>137,472</u>

LOCOMOTIVE EXPENSES.

Mileage—Passenger Trains, 1,049,588; Goods ditto, 318,058; Total Train Miles, 1,367,646; Piloting, Light Running, and Bal-lasting, 115,212; Total Engine Mileage, 1,482,858.

	Per Train Mile.	
	lbs.	d.
Coke, per Mile, Passenger Trains.....	24·23	cost 2·81
Ditto Goods do.	33·92	do. 3·93
Average	26·48	do. 3·07
	Per Train Mile.	
Wages to Enginemen and Firemen	1·560	
Cleaners, Fire-lighters and Cokemen.....	0·411	
Oil, Tallow and Grease	0·215	
Cleaning, Waste and Shed expenses.....	0·218	
Water	0·229	
Coke at 21s. 7½b. per ton	3·294	
Total Cost of Locomotive Working	5·927	
Repairs 2·037d., Renewals 1·163d.	3·200	
Superintendence	0·226	
Total Working and Repairing	9·353	
Repairs of Carriages 1·043d., Waggon 0·803d. ...	1·846	
Renewals ditto ditto.....	1·424	
Total Engines, Carriages, and Waggon... ..	12·623	

GENERAL EXPENDITURE.

£		Per Train Mile.	Per Centage to Receipts.
		d.	
39,750	Permanent Way	6·975	8·50
53·302	Locomotive Expenses	9·353	11·40
18·630	Carriage and Waggon Repairs ...	3·269	3·99
	Police, Signalmen, &c.....	0·864	
	Coaching Traffic Expenses	4·342	
80,850	Goods do. do.	5·566	17·30
	Gas	0·360	
	General Charges	3·056	
192,532	Total Working Expenses... ..	33·785	41·19
32,926	Rates, Taxes, and Gov. Duty ...	5·778	7·05
225,458	Total Expenses.....	39·563	48·24
	Gross Receipts	£467,391	

Gross Receipts per Mile for the Half-year	£ 1611·3
Ditto Expenses ditto ditto	776·7
Average Weekly Receipts per Mile.....	62·0
Ditto Expenses ditto	29·9

SOUTH WALES.

Half-year ending December, 1851.

Mileage—Passenger Trains, 162,776; Goods do., 22,944; Total Train Miles, 185,720; Piloting, &c., 1440; Total Engine Miles, 187,160.

GENERAL EXPENDITURE.

	Per Train Mile. D.	Per Centage to Receipts.
Maintenance of Way.....	7·131	12·33
Locomotive Expenses	6·687	11·56
Traffic Expenses.....	4·456	7·71
Compensation.....	0·122	0·21
Use of Plant	6·219	10·76
General Charges.....	3·530	6·12
Total Working Charges.....	28·145	48·69
Rates Taxes and Government Duty	1·951	3·38
Total Expenses	<u>30·096</u>	<u>52·07</u>

Total Receipts, £44,736; Ditto Expenses, £23,295.

COST OF WORKING.

Synopsis of the foregoing details.

NAMES OF RAILWAYS.	Date.	GENERAL EXPENDITURE. Per Centage to Receipts.								Locomotive Expenses per Train Mile.	Total Receipts for Half Year.
		Permanent Way.	Locomotive Expenses.	Carriage and Wagon repairs.	Coaching charges.	Goods charges.	General charges.	Rates, Taxes, and Gov. duty.	Total.		
Aberdeen	1851	11.21	24.57	..	4.51	8.85	8.31	4.89	62.14	9.56	52.40
Bristol and Exeter .....	..	8.34	..	..	..	..	..	..	41.44	11.32	..
Ditto	1854	16.71	13.50	2.05	6.55	8.62	5.65	5.37	36.45	11.39	1510.80
Caledonian	1852	7.75	15.38	..	4.51	8.32	5.73	5.80	52.21	13.37	1288.20
Ditto	1854	6.27	15.02	3.61	4.97	8.52	6.09	1.29	43.34	9.78	1164.0
Eastern Counties	1853	4.50	14.53	..	5.97	14.08	5.74	1.29	46.02	..	1377.32
Ditto	1854	5.34	14.14	3.54	5.97	11.85	4.20	4.51	49.42	9.94	1301.52
East Lancashire	1850	5.58	12.79	3.84	5.70	11.81	3.17	4.08	47.39	..	1332.50
Ditto	1851	5.03	11.93	3.41	4.96	12.66	2.92	3.73	44.72	..	1406.79
Ditto	1854	6.28	11.54	3.73	4.57	12.91	2.19	2.54	43.66	..	1653.20
Edinburgh and Glasgow	1851	6.20	11.90	..	6.15	8.96	5.17	3.37	41.15	8.99*	..
Glasgow and South Western	1852	4.78	16.63	5.47	4.03	8.15	3.92	2.44	45.40	..	624.92
Great Northern	1851	4.95	17.35	2.91	7.90	8.02	5.51	3.11	49.75	8.12	1309.80
Ditto	1854	9.12	16.61	3.96	5.96	9.13	4.61	3.39	51.78	9.09	1660.60
Great Western .....	..	10.40	9.13	4.12	11.86	..	2.39	4.37	42.30	..	1846.04
Lancashire and Yorkshire .....	..	4.03	11.53	3.60	5.07	11.75	2.37	2.65	44.17	..	3011.23
Ditto .....	..	4.66	9.53	2.93	4.02	11.02	1.67	3.44	41.06	9.17	2145.10

Lancaster and Carlisle	1832	5.69	19.19	5.07	6.91	3.33	2.69	42.88	..	1863.09
London and Brighton	1845	5.18	11.97	3.26	5.74	4.06	7.55	55.85	..	..
Ditto	1854	6.29	13.91	4.21	8.39	2.39	6.43	46.03	15.42	1991.84
London and North Western	1855	5.55	13.56	3.85	6.59	5.62	3.85	45.50	..	2507.35
London and South Western	1852	4.12	11.39	2.85	10.38	1.67	5.35	36.81	11.36	1560.13
Ditto	1854	7.89	12.67	2.97	13.74	2.44	6.08	45.79	11.10	1980.49
Manchester, Sheffield, and Lincolnshire .....	..	8.28	21.08	5.61	21.53	2.92	2.28	61.70	11.17	1189.92
Midland	1851	5.55	16.78	4.54	5.89	1.25	3.37	41.86	9.93	1258.66
Ditto	1854	7.34	18.12	3.92	13.91	3.98	3.03	48.49	..	1379.89
Midland Great Western	1851	4.04	22.92	8.38	4.27	0.13	39.74	..	..	265.26
North British	1852	10.48	18.63	6.09	8.11	2.32	5.27	50.90	..	659.65
Ditto	1854	12.89	18.51	6.16	6.19	3.10	4.57	59.70	14.25	771.45
North Eastern (Y. N. and B.)	1851	5.43	13.95	5.09	4.76	4.57	3.06	41.99	7.59*	..
Ditto	1854	6.01	16.82	7.30	9.71	2.17	4.24	49.28	11.12	1087.08
Scottish Central	1851	11.27	17.53	4.19	3.66	1.64	2.12	45.26	..	946.64
Ditto	1854	9.58	17.11	3.48	4.48	6.98	3.31	44.94	..	1181.70
South Eastern	1851	3.46	10.65	3.21	..	16.55	7.95	43.32	10.99	1403.83
Ditto	1854	6.25	11.87	3.95	7.55	7.91	7.43	48.55	12.14	1590.08
Ditto .....	..	8.50	13.40	3.99	17.30	3.59	7.05	48.34	12.62	1611.30
South Wales	1851	12.33	11.56	18.68	17.30	6.12	3.38	52.07	..	475.91
Average .....	..	7.26	13.06	3.97	5.37	8.23	4.04	46.58	41.15	1347.17
Ditto .....	..	..	17.76	13.51	..	..	..	..	..	..

* Exclusive of Carriage and Wagon repairs.

The results shown in the preceding table may safely be accepted as the average of the working railways in the United Kingdom, the details upon which they are founded having been taken during periods when wages and materials were very low, and also at seasons when they were equally high. It thus appears that the cost of working the railway system in Great Britain has hitherto averaged upwards of $46\frac{1}{2}$ per cent. upon the receipts, and that the several items of expenditure bear the following proportion to the whole :—

Permanent Way	15.6	} Per Cent. to Total Expenses.
Locomotive Power	29.3	
Carriage and Waggon Repairs	8.4	
Coaching Department	11.5	
Goods ditto	17.6	
General Charges	9.0	
Rates, Taxes and Government Duty ...	8.6	
Total.....	100.0	

The cost of locomotive working and repairs, including renewals, and repairs and renewals of carriages and waggons, has averaged elevenpence per train mile run.

CHAPTER III.

It is much to be regretted that railway companies have not adopted one uniform plan of recording and publishing the details of their revenue and expenditure. Unfortunately, the half-yearly reports of no two companies are precisely alike; while many are so meagre as to afford no data upon which to ground a comparison with the results of working on other lines. Such documents as these possess little or no public value. In this respect we are far behind our neighbours on the continent, especially in Belgium, where for years the most minute details of railway economy have been carefully recorded. It is true the London and North Western, Great Northern, Eastern Counties, and some few other lines,

present their shareholders with a great deal of useful information, though not so much as might be advantageously given; but the balance-sheets of the majority of the companies, are at present very unsatisfactory productions. This paucity and dissimilarity of information renders it extremely difficult to deduce any general laws from the published results of railway working, and it is hopeless to expect to attain to that extent of improvement, of which railway management is susceptible, or to bring working expenses within the narrowest limits compatible with efficiency, until there has been a perfect assimilation of working throughout the whole of the railway system. This, more than any other thing, would tend to raise railway property from its present depressed condition, and to place it on a sound basis. The first step towards this desirable end is for railway companies to agree upon a uniform system of accounts for adoption by them all, in which all the various details of income and expenditure are carefully arranged under certain agreed general heads. The half-yearly balance sheets of the respective companies would then each contain the same items, and these items would be made up of the same details. Most companies would, of course, have some items of expenditure peculiar to themselves, but these would be separately recorded, and would not affect the comparison with each other of the various items common to them all.

The following form of revenue and expenditure account is suggested, as one conveying much information which it is very desirable should be known, but which is not at present generally given. Its adoption would cause but little inconvenience compared with its great utility. It is similar in its general features and arrangement to those of some of the companies already referred to, but contains several details omitted by them.

Statement of Revenue Receipts and Expenditure

Dr.

				Per Centage to Receipts.	
				Present Half-year.	Corresponding Half-year, 189—.
	£	s.	d.		
To Maintenance of Way, Stations, signals and approaches, as per abstract A.					
To Engine working, repairs and renewals, as per abstract B.					
To Repairs and renewals of Carriages and Waggon, as per abstract C.					
To Coaching Traffic charges, ditto D.					
To Merchandise, mineral and traffic charges, as per abstract E.					
To General charges, ditto F.					
Total Working Expenses					
To Government Duty					
To Rates and Taxes					
Total ordinary Traffic Expenses ...					
To Canal and Harbour expenses, as per abstract G.					
To Balance					
£					
To Interest on Loans and Debentures				£	s. d.
To Rents payable					
To Proportion of Expenses of joint Stations...					
To Guaranteed dividends, as per abstract H...					
To Dividend on Preference Stock					
To Proposed dividend of — per share on £—— Unguaranteed Stock, being at the rate of — per cent. per annum					
To Balance carried forward to next half-year.....					
£					

RAILWAY COMPANY.

for the Half-year ending — 185—.

CR.

MAIN LINE.			Corresponding Half-year, 185—.	
			Increase.	Decrease.
By Receipts from ——— Passengers	£	s. d.		
By do. for conveyance of Horses, Car- riages, and Dogs				
By do. do. Mails				
By do. do. Parcels.....				
	£	s. d.		
By do. do. Goods—tons...				
By do. do. Minerals—tons				
By do. do. Coals—tons ...				
By do. do. Cattle				
Total Traffic Receipts on Main Line.....				
By Receipts on Branch Lines (Appendix AA.)				
By Canal and Harbour Receipts (ditto BB.)...				
By Receipts from Leased Lines (ditto BB.) ...				
By Sundry receipts (ditto CC.).....				
Total Revenue.....£				
By Balance brought over				
By ditto brought forward from last half-year				
	£			

ABSTRACT A. MAINTENANCE OF WAY.

Double Line miles. Single ditto miles. Total miles maintained.

	£	s.	d.	Per Mile maintained.
				£
Superintendence				
Maintenance of Way, Bridges, Culverts, &c.				
Repairs of Stations and approaches.....				
Renewals.....				
Signals				
Total.....£				

ABSTRACT B. LOCOMOTIVE POWER.

MILEAGE.

Passenger Trains —. Goods ditto —. Total— Train miles.

Do. Piloting and Light running —. Do. Piloting, &c.—Ballasting —.

Total Engine Miles ——. Proportion of Piloting, &c., to Train miles—per cent.

EXPENDITURE.

	£	s.	d.	Per Train Mile.
Superintendence and Office Expenses				
Wages to Enginemen and Fireman				
Coke and Coal.....				
Lamp Lighting				
Tube Cleaners, Labourers, and Cokemen.....				
Oil				
Tallow				
Waste and sundry small Stores				
Wages and Materials for Lighting and Cleaning } Engines				
Water				
Total running Expenses				
Engine repairing—Wages				
Ditto Materials				
Engine renewals—Wages				
Ditto Materials				
Total Expenses				
Less Ballasting and Work done for other de- } partments				
Net Cost of Engine Working and Repairing.....£				

ABSTRACT C. REPAIRS AND RENEWALS OF CARRIAGES AND WAGGONS.

	£	s.	d.	£	s.	d.	D.	Per Passenger Train Mile.
Carriages—Repairs, Wages.....								
Ditto, Materials								
Ditto, Renewals, Wages								
Ditto, Materials								
Proportion of Charges for Superintendence, &c.}								
Per cent. to Coaching Receipts								
Waggons—Repairs, Wages.....								
Ditto, Materials								
Ditto, Renewals, Wages								
Ditto, Materials								
Proportion of Charges for Superintendence, &c.}								
Per cent. to Goods Receipts—Total								

ABSTRACT. D. COACHING TRAFFIC CHARGES.

	£	s.	d.	D.	Per Passenger Train Mile.
Salaries to Superintendents and Clerks.....					
Wages to Ticket Collectors, Guards, Porters, Police, } Pointsmen, &c.....					
Stationery, Tickets, and Advertising					
Station Working Expenses, Gas, Water, &c.....					
Clothing					
Compensation					
Collection and Delivery of Parcels					
Lamplighting, Grease, &c. for carriages					
Sundry charges					
Total ordinary Charges.....	£				
Due to [or from] other Companies for the Use of } Carriages					
Total Charges.....	£				
Per cent. to Coaching Receipts					

ABSTRACT E. MERCHANDISE CHARGES.

				Per Goods Train Mile.
	£	s.	d.	
Salaries to Goods Managers, Clerks, &c.				
Wages to Guards, Porters, Waggon Greasers and Waggon Inspectors				
Stationery, Printing and Advertising				
Station Working Expenses, Gas, Water, &c.				
Lamplighting, Grease for Waggon, &c.				
Engine and Horse-power for Shunting				
Clothing				
Compensation £—, Bad Debts £—				
Collection and Delivery of Goods				
Repairs and Renewals of Tarpaulin Covers				
Sundry Charges				
Total ordinary Charges				
Due to [or from] other Companies for the Use of Waggons, Tarpaulins, &c.				
Total Charges	£			
Per cent to Goods Receipts				

ABSTRACT F. GENERAL CHARGES.

	£	s.	d.
Direction and Travelling Expenses			
Expenses of Secretary, Transfer and Cashier's Offices, including Salaries			
Ditto Audit and Accountant's Offices			
Ditto General Manager's do.			
Postages, Printing, and Stationery			
Clearing House Expenses			
Electric Telegraph			
Sundry Expenses			
	£		

ABSTRACT G. CANAL AND HARBOUR EXPENSES.

	£	s.	d.
Wages to Lockkeepers, Boatmen, Repairs of Boats, Horses' } Keep, &c.			
Salary to Pier Master, Wages to Porters and Harbour } Expenses			
Total.....	£		

Per Centage to Canal and Harbour Receipts —.

ABSTRACT H. GUARANTEED LINES.

	£	s.	d.	£	s.	d.
Amount of Dividend of — per cent. guaranteed } to — Railway.....						
Less Net earnings						
Amount of Dividend of — per cent. guaranteed } to — Railway.....						
Less Net earnings						
Total.....	£					

APPENDIX A A. BRANCH LINE RECEIPTS.

1. ——— BRANCH.

	£	s.	d.	£	s.	d.	Increase.	Decrease.
Passengers.....								
Horses, Carriages, and Dogs.....								
Mails and Parcels								
Goods, Minerals, & Coals — tons								
Total Receipts								
Working Expenses £ —. Profit £ —.....								
2. ——— AND ——— BRANCH.								
Passengers.....	£	s.	d.					
Horses, Carriages, and Dogs.....								
Mails and Parcels								
Goods, Minerals, and Coals								
Total Receipts								

Working Expenses £ —. Loss £ —.

APPENDIX BB.

LEASED LINES, HARBOUR AND CANALS.

	Receipts.			Expenses.			Profit.			Loss.		
	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.
— Canal												
— Harbour												
— Line Leased } to this Company.. }												
Total.....												

APPENDIX CC. SUNDRY RECEIPTS.

	£	s.	d.
Interest on Cash at Bankers and on calls in arrear			
Transfer Fees			
Rents of Land and Buildings			
Dividends on Shares held in other Companies			
Total	£		

RETURN OF ROLLING STOCK, _____, 185--.

FORM OF REVENUE ACCOUNT.

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[illegible]

It is not perhaps necessary to give a form of capital account. The statements of capital received and expended should however be full and explicit, showing on the debit side, the amount received on each description of shares ; the loans, with the rate of interest at which they were borrowed; the proceeds from the sale of surplus property ; and the amount of any temporary advances which may have been made from revenue to the capital account. On the credit side should be shewn.

1. The cost of preliminary surveys, and of obtaining the act of incorporation.
2. Legal and parliamentary expenses subsequent to the act.
3. Engineering expenses.
4. Cost of land used in constructing the line ; charges for conveyancing, cost of arbitrations, &c.
5. Cost of constructing the line, bridges and tunnels.
6. Cost of stations and approaches, offices, warehouses and workshops, cranes and weighing machines.
7. Cost of engines and tenders.
8. Cost of passenger stock.
9. Cost of goods waggons, guard's vans, tarpaulins, &c.
10. Cost of machinery and tools for workshops.
11. Cost of water-cranes and stationary engines for pumping water.
12. Shares held in other companies.
13. Electric telegraph and signals.
14. Value of surplus land and buildings.
15. Cost of direction, office, and travelling expenses prior to the opening of the line.
16. Cost of each branch line.

In this balance-sheet the amounts received and expended during the current half-year should be shewn in separate columns, so as to be distinguished from previous receipts and expenditure. If a line be of considerable length, and its works much varied in character, it should be divided into sections, and the cost given of each particular division.

These observations are thrown out rather as hints to be improved upon, than as containing any perfectly developed plan. Whatever form be adopted, it is essential that it should be simple, clear, and intelligible to any person of ordinary capacity. The great objects to be kept in view are a perfect uniformity of accounts, and the rendering every railway balance sheet valuable as a document for present information and future reference. Among those to whom is committed the keeping of railway interests, are some of the most astute and experienced men in the commercial world ; if they would only devote to this subject the degree of attention which its importance demands, they could have no difficulty in at once placing railway accounts upon a more satisfactory footing, and in rendering them better adapted to the great and daily increasing magnitude of the financial transactions they are intended to record.

Railway Clearing House.—The nucleus of a uniform plan of railway working already exists in the Clearing House. As railways extended and their points of junction with each other became more numerous, it was found necessary, from economical considerations, and for the public convenience, that they should be worked, to a certain extent, as one continuous system. The transshipment of passengers and goods, at each particular junction, was too great an evil long to be tolerated. Arrangements were made, by a few of the railway companies, for the through running of rolling stock

and booking of traffic over their respective lines. This led to their having complicated accounts with each other, which were difficult to verify, and hence became a prolific source of dispute. To obviate this, and facilitate the extension of the system of through booking, the Railway Clearing House was instituted, being similar in its objects and plan to the Clearing House established many years since by the bankers in London. It is managed by a committee consisting of one delegate from each of the admitted companies. This committee meets quarterly, or oftener if necessary, for the transaction of business, and has a staff under its control consisting of a secretary, treasurer, clerks, inspectors, number-men, &c. The Clearing House keeps an account of all traffic in which two or more companies, members of its body, are interested. To this end it receives periodical returns, from each Clearing House Station, of all passengers, parcels, goods, or other traffic, booked to or received from stations on other lines, the "outwards" returns being printed black, and the "inwards" returns red, in order that they may be at once distinguished from each other. It has also number-men placed at the various junctions, who carefully note the numbers of all engines, carriages, waggons, and other rolling stock, and also waggon-covers, passing from any one line on to another. From the data thus obtained the accounts are posted up, and the balances due to or by each individual company, to or from all other companies, parties to the clearing system, are carefully adjusted, and statements thereof furnished periodically to the several companies concerned. These balances are paid to the treasurer of the Clearing House, and divided in proportion to the mileage the traffic has been conveyed, or the rolling stock run, over each line; or according to fixed agreement, or special

arrangement, as the case may be. The expenses of the clearing establishment are borne by the respective companies members of it, the amounts payable by each company being proportionate to the number of entries in its accounts, or to the balance placed to its credit. The Clearing House now numbers upwards of sixty companies, and the only lines of importance not at present connected with it are those comprising a portion of the Great Western system, with which and the narrow guage lines, there has been, until recently, but little interchange of traffic. One most important result of the Clearing House system has been the equalisation of rates for the conveyance of traffic, and the adoption of a general classification of goods and minerals. The Clearing House has unquestionably, to quote the words of the preamble of its act of 1850, "been productive of great convenience to the public, and of a considerable saving of expense in the transmission of passengers, animals, minerals, and goods, over the lines of the several railway companies parties to the association." It is very desirable that its operations should become still more extended, so that the whole of the railway system may ultimately be worked as harmoniously and with as much facility as though it were but one undertaking.

The following is the present Classification of Goods & Mineral Traffic, as adopted by the Clearing House Committee.

MINERAL CLASS.

Bricks, common	Flags	Pyrites
Cannel	Granite, undressed	Salt, rock and un-
Clay	Iron Stone	manufactured
Coal	Iron Ore	Sand
Compost	Iron, Pig and Scrap	Scoria
Chromate Ores	Lime and Lime Stone	Slates, common
Coke	Materials for road	Slag
Culm	repairs	Stone of all sorts
Dross	Manure, in bulk	Tiles
Fire Bricks	Peat	Turf

SPECIAL CLASS.

Alabaster	Emery stone	Manganese
Asphaltum	Farina	Mangel Worsel
Baggage, Military, 2d. per ton per mile	Flints	Metal, old
Barytes	Flour	Nitrate of Soda
Baywood	Founder's Dust	Ochre
Beans, as grain	Fuller's Earth	Oilcake
Bones, common, for size or manure	Fustic	Peas, as grain
Bran	Gas and Water Pipes	Pelts, wet
Burr Stones	Grain	Pig Lead
Brimstone	Guano and packed	Plaster
Cabbages, loose	Manures	Postwood, M. Wt.
Carrots, loose	Gypsum	Potatoes, old
Cement	Hominy	Pozzolano
Chalk	Iron Boiler Plates,	Propwood M. Wt.
Charcoal	Bars & other un-	Retorts
China Clay	damageable iron	Salt Cake
Clog Blocks, rough	Iron Rails and Chairs	Sanitary Tubes
Coal Dust, in bags and casks	Iron Pipes	Sleepers
Copper Ore	Lathwood	Soda Ash
Corn	Lead Ore	Soot, in bags
Deals, 2½ tons per standard	Linseed in full loads	Staves
	Lindseed Meal	Timber
	Logwood	Turnips
	Mahogany, in logs	Whiting
	Malt and Meal	Vegetables, loose

FIRST CLASS.

Ale & Porter, in casks	Felloes	Pumice Stone
Alum	Flummery	Putty
Anchors	Girders, Iron not exceeding 20 feet long	Quercitron Bark
Anvils, common		Rags
Apples and Pears	Galvanised Iron	Railway Pins, Wheels, Axles, & Springs
Argols	Gambier	Rivets
Arm & Share Moulds	Grease	Ropes
Ashes, Pot and Pearl	Greaves	Rosin
Barilla	Grindstones	Rotten Stone
Bark, Tanner's pkd.	Hides, raw, salted or in Bales	Saltpetre
Black Bottles	Hoofs in casks	Seal Skins, wet and salted
Blacking	Hoops, Wood and Iron	Sheathing
Bleaching Powder		Shumac
Blubber	Horn Tips, packed	Shot, Cannon
Boilers, small, under four tons	Ice, packed	Size, liquid
Cables, Iron	Iron Tubing	Slate Slabs, in cases
Canada, Plates	Iron, Hoop, Sheet or other damageable [parts	Soda
Cannon	Iron Turntables, in Jute	Spelter
Cannon Balls	Ketchup	Spikes
Castings, heavy	Kips, in bales	Spokes
Catsup	Laths, in bundles	Sugar, raw
Chains and Traces	Lead Ashes, in bags	Sulphate of Copper
Chicory Root	Lead, sheet & piping	Sulphate of Soda
Cider and Perry, in casks	Lead, red & white	Sulphate of Zinc
Clog Soles, dressed	Litharge	Tallow
Copperas	Marble, in blocks	Tar
Cotton Wool	Metals, sheathing, &c.	Terra Japonica
Creosote, in casks	Nails, Iron	Tin
Crowbars	Nicaragua Wood	Vitriol Stone
Cullett	Onions [Nut	Valonia
Cutch	Oil, Palm & Cocoa	Vinegar
Divi Divi	Paper, coarse	Wire Rods & Wire, not damageable
Dyewoods, not elsewhere specified	Pegs	Woad
Earthenware Bottles	Pitch	Wood Acid, in full loads
Empty Packages, full loads		Zinc, ingots, &c.

SECOND CLASS.

Alkanet Root	Canvas	Field Seeds
Annatto	Cardamoms	Figs
Archil	Carpeting	Files
Arrow Root	Carriage Springs,	Fish, Salt, casks and
Assafœtida	Axles, and Steps	dried
Bacon	Chicory, prepared	Flax
Bagging	Chocolate	Flocks
Balsam Copaiba	Cider, in casks	Fry Pans
Bark, loose	Clod Crushers	Galls
Bass Mats	Cobalt	Ginger
Bedsteads (common)	Cockles and Muscles,	Glass, Crown, in
Wood	at owners' risk	boxes & crates
Beef & Pork in casks	Cocoa Nuts	Glass, Flint, in
Bichrome	Cocoa	casks, 5 Cwt.
Biscuit	Codilla	Glass, Window,
Black Lead	Coffee	rough plates
Bladders	Colours	} At sender's risk.
Bone Flats	Copper	Garincine
Bones, loose	Cordage	Glue and Glue pieces
Boracic Acid	Cotton Waste	Grindery
Borax	Cotton Yarn	Groceries, General
Boxwood	Cowries	Gums, of all sorts
Brass Wire	Cream of Tartar	Gun Barrels, rough
Bread	Crematine	Gun Stocks, rough
Bristles	Cranberries	Gutta Percha
Bricks, Bath or Flan-	Cudbear	Hair, Plasterer's
ders	Currants, Grocers	Hammer Heads
Broom Heads	Dregs	Hams
Brushes	Drugs, in casks	Hardware, packages
Buckles, Iron	Dry Salteries, in casks	above 5 cwt.
Butter, in casks &	Earthenware & China	Hemp
boxes	in casks & crates	Hemp Seed
Buttons	Edge Tools	Herrings, Salt
Camata	Eggs, in crates and	Hinges, Iron
Camatina	boxes	Hoes
Candles	Emery	Hollow-ware, in hhds.
Candlewick	Felt	Hoofs, Cow and Ox,
Canes, packed	Felspar	loose
		Honey

SECOND CLASS—*continued*

Horse Shoes	Moss in bales	Screws, Iron
Horns, Cow and Ox, loose	Munjeet	Scrows
Horn Tips, loose	Mustard Seed	Scythe Stones
Hurdles	Naphtha, in casks	Seeds, Clover, &c.
Ice, loose	Nuts	Senna
India Rubber	Oakum	Shell Lac
Iron Bedsteads	Oils, in casks, except Palm	Shot, small in bags
Iron Liquor	Old Clothes	Shovels
Iron Wire, bright	Oranges and Lemons	Shudes
Ivory Black	Orchilla Weed	Silk Waste
Juniper Berries	Osnaburgs	Simovi
Kelp	Oxalic Acid	Sink Traps
Lac, all sorts	Paints	Slate Pencils
Lamp Black	Palm Leaves	Slates, Writing
Lard	Palisades	Smalts
Lasts, in hampers	Paper Hangings	Sizing
Leather, undressed	Pearl Shells	Soap
Lemon Juice	Pelts, dry	Soda Water
Lignum Vitæ	Piassava	Soldiers' Clothing
Linseed, small lots	Picker Bends	Spades
Lime Salt	Pins, Metal, in boxes	Spetches
Locks	Provisions, Salt	Spoons, Iron
Locomotive Tubes	Potatoes, Preserved	Starch
Machines, Weighing, large	Raisins	Steel, bars & bundles
Machinery, heavy	Refiners' Sweepings	Sugar Mills
Madders	Rice	Sugar, refined (lump)
Marble, in boxes	Sad Irons	Sugar of Lead
Mastic	Safflower	Sugar Moulds & Pans
Matchetts	Safety Boxes	Syrup
Mats and Matting	Safes, Iron	Tapioca
Meat, cured	Sago	Tarpaulins
Millboards	Salammoniac	Tartaric Acid
Millstones	Sarsaparilla	Tincal
Molasses	Sash Weights	Tips
Mop & Broom Han- dles	Sarsafras	Tobacco, leaf
	Saws	Tous-les-mois
	Screw Jacks	Trees & Plants,* in mats, heavy
		F 2

SECOND CLASS—*continued*

Trenails	Verdigrise	Wire, bright
Turmeric	Vetches, small lots	Wood Acid, in casks,
Turpentine	Vices	in small lots
Twist Cotton	Waste, Cotton and	Wool
Twigs, brown	Woollen	Yarn, Linen & Cotton
Umbrella Stretchers	Washers	Yeast, casks, full loads
Varnish, in casks	Weft Cotton	Yellow Berries
Vegetable Wax	Whetstones	Zaffers
Veneers	Window Blinds	Zinc, sheets, &c.

THIRD CLASS.

Acetic Acid, in casks	Counterpanes	Glass, Flint
Ale & Porter, bottled	Cards	Grapes, owner's risk
American Clocks	Cassia Lignea	Grates, common
Angelica Root	Castor Oil	Goods, heavy, not
Asparagus	Cast-iron Pots	specified
Bales, Boxes, Cases,	Castings, light	Guns and Pistols
Packs, & Trusses	Cheese, Stilton and	Hair, Upholsterers'
of Manchester &	common	Hardware, Light
Barnsley Manu-	Cider, bottled	Hatters' stuff
facturers' Scotch	Cochineal	Hides, dry loose
Cotton Goods &	Cockles	Hides, green or market
Irish Linens	Confectionary	Hooks and Eyes
Bark, Peruvian	Copper Rollers	Hops
Bees' Wax	Cork Wood	Horns, Stag
Bellows	Crucibles	Hosiery
Black Beer	Cutlery	Iron Fencing
Blankets	Drugs, boxes or ham-	Indigo
Blowing Engines	pers	Juice
Bobbins	Fenders, cast Iron	Leather, dressed
Books	Fire Irons	Limpets
Boots and Shoes, in	Flannel	Linens
casks	Floor Cloth, not ex-	Liquorice
Butter, in cools	ceeding 10 ft. lg.	Muscles
Calicoes	Fruit, Ripe	Muskets, in cases
Canada Stoves	Girders Iron, exceed-	Mustard
Candy Sugar	ding 20 feet in	Nails, Copper, and
Combs, in boxes	length	Brass

THIRD CLASS—*continued*

Nux Vomica	Saddlery	Tobacco, Manufactured
Ovens, common	Scale Beams	Trays, Iron
Oysters	Scythes	Twigs, white
Packs and Bales	Seal Skins, dry	Umbrellas
Paper, fine	Sheep Skins	Vegetables, in baskets
Pepper	Shoes, in casks	Wadding
Perry, bottled	Sickles	Warps, (Cotton) in bundles
Periwinkles	Smallwares	Whalebone
Pickles	Snuff	Wheels, Wood
Pimento	Spade Trees	Whelks
Plumbago	Sponge, in bales	Window Frames, cast Iron
Potatoes, new	Stags' Horns	Wine and Spirits, in casks
Rabbit Skins, dressed	Stationery, general	Yarn, Woollen and Worsted
Railway Tickets and Cards	Steel Toys	
Rattans	Stoves, common	
Rushes, packed [gery	Sugar Candy	
Saddlery Ironmon-	Sweets and Cordials	
	Tapes, Tacks, Teas	

FOURTH CLASS.

Acetic Acid, carboys	Crape	Lace
Agricultural Imple-	Drapery	Lamps [cified
Almonds [ments	Floor Cloth, exceeding 10 feet in length, not carried uncased	Light Goods, not specified
Almond Oil	Garden Plants, in pots and seeds	Looms
Aloes	Garden Seats, light	Luggage, Trunks, &c.
Amber	Gig Shafts [fied	Machines, light
Anchovies	Goods, light, not specified	Machines, Weighing, small
Aniseed	Handmills	Magnesia
Balsams	Hay Rakes, in bundles	Marble Slabs
Baskets	Hay and Straw	Meat, fresh
Bottles, glass, white	Ink	Naphtha, in tins
Brooms	Isinglass	Nutmegs
Butter, in crocks	Joiner's Work	Needles, in boxes
Calenders		Oil, in jars and boxes
Canes		Parchment
Chandeliers		Pickles
Cornice Poles		

Picture Frames	Salmon, in boxes	Travellers' Patterns
Pipes, smoking	Shovels, wooden	Tubing, Copper and
Plated Goods	Shoes, in hampers	Brass
Poultry, dead	Sticks and Stails	Trays, paper
Powder Blue	Stoves and Grates,	Type
Printers' Ink	polished	Varnish, in tins
Puncheons, New,	Straw Plait, light	Wine and Spirits,
empty	Tamarinds	bottled
Quicksilver	Teazles	Woollen & Worsted
Quills	Tinware	Goods, not else-
Rabbits	Tongues, animal	where specified
Reeds and Rushes	Tortoise Shell	Yeast, German

FIFTH CLASS.

Bonnets	Fish, fresh	Perfumery
Cabinet Ware	Furniture	Pianos and Organs
Chairs	Furs	Pictures
China, in boxes	Game	Poultry, alive
Cigars	Glass, stained & plate,	Silk, manufactured
Cinnamon	at owner's risk	Silk, raw
Clocks	Glass Shades, at	Sponge, Turkey, in
Eau de Cologne	owner's risk	cases
Elephants' Teeth	Gloves	Statuary, as per agree-
Embroidery	Hats	ment only
Essences	Millinery	Toys
Essential Oils	Musical Instruments	Turtle
Feathers		

Railway Accidents.—The decided superiority of railway travelling over other modes of locomotion, is no longer a matter of controversy. The only drawbacks to its perfect efficiency are the accidents that occasionally take place, and which are, unfortunately, generally of a serious character. That they should be so is not at all surprising, when we take into consideration the immense momentum which a railway train, weighing sixty or seventy tons, necessarily

acquires, when running at speeds of from thirty to fifty miles an hour. To prevent the occurrence of accidents, or lessen as much as possible their disastrous consequences, is one of the most important problems which can engage the attention of railway managers and scientific men. It is hopeless ever to expect perfect immunity from accidents. The best constructed machinery will occasionally give way; the most vigilant servant sometimes be found remiss; the most ingenious mechanism may fail to act at the critical moment; or precautions, the fruits of the experience of years, be frustrated in an instant by some unforeseen and extraordinary combination of circumstances. Yet, notwithstanding this, it is but repeating a truism to state, that, of all modes of travelling, that by railway is attended with the least danger. During the year 1854, nearly one hundred and eleven and a quarter millions of passengers were conveyed 1,622,048,490 miles, in the aggregate, the number of trains being 1,297,615. During this period there were thirty-one passengers killed, of which number twelve only were killed from causes beyond their own control; nineteen, or three-fifths of the whole, having fallen victims to their own imprudence. It thus appears that, in the year referred to, the fatal cases of accident to passengers, in which any responsibility attached to the railway authorities, were only in the following ratios :—

One passenger killed to every $\left\{ \begin{array}{l} 9,267,22 \text{ passengers conveyed; or} \\ 13,170,707 \text{ miles travelled; or} \\ 108,135 \text{ trains run.} \end{array} \right.$

The minor cases of accidents were of course much more numerous; still these did not exceed the following proportions :—

One passenger injured to every $\left\{ \begin{array}{l} 335,972 \text{ persons conveyed; or} \\ 4,900,450 \text{ miles travelled; or} \\ 3,920 \text{ trains run.} \end{array} \right.$

We find from these figures that upwards of nine and a quarter millions of persons are conveyed, by 108,135 trains, an average distance of nearly fifteen miles, with a loss of life to one passenger only; and that more than three hundred and thirty-five thousand nine hundred persons are conveyed the same distance, by 3,920 trains, with only one case of personal injury. These figures ought to be sufficient to reassure the most timid, or convince the most sceptical, as to the safety of railway travelling; especially as the number of persons killed and injured, in the year from which these calculations are taken, was considerably higher than the average of previous years. These figures of course refer to accidents which arose from circumstances entirely beyond the control of the passengers. It would be unfair (although it is frequently done) to tax railway companies with the consequence of the individual imprudence of the travellers themselves. It is difficult, therefore, to understand on what grounds an outcry has been raised against railway directors and officers, of indifference to the public safety, and neglect to take even ordinary precautions against accidents. Still more difficult is it to understand why the legislature, which regards with comparative unconcern the fact that two vessels and two human lives are daily lost on the British coast alone from causes which are to a great extent preventable, should be continually harrasing directors with threats of bills of pains and penalties, for an assumed neglect, of which it must in justice be said they are not guilty. We have not the slightest hesitation in asserting, that if railways were in the hands of the government, or all the suggestions were acted upon which are so profusely offered by the Railway Department of the Board of Trade, the traffic would be conducted at a

far greater sacrifice of life and property than is at present the case. This is no random assertion ; it is amply borne out by daily specimens of governmental mismanagement, and by a careful perusal of the documents which emanate from the Railway Department at Whitehall. To shew the absurdity of some of the recommendations of this body, and how little its officers are fitted to lay down rules for conducting railway traffic, it is only necessary to quote the following passage from Captain Galton's Railway Report for 1854:—

“There are undoubtedly great difficulties in running the goods trains to a fixed time-table, because the work they have to perform at the different stations varies every day ; and the operation of detaching wag-gons from the trains, or putting them on, is not so simple an operation as setting down passengers ; but with the facilities which the electric telegraph affords for organising traffic, there is no reason why arrangements should not, if necessary, be made at some central point on the line to *suit the requirements of each day, and the engine drivers furnished with time-tables adapted to each journey.*”

If Captain Galton should, unfortunately for the public and himself, ever be charged with the responsibility of managing one of our larger railways, and attempt to work it on the system he here recommends, he would thoroughly disorganise the whole traffic in less than a month, and compel the Railway Insurance Company to raise their rates of premium. His recommendation is at direct variance with all past experience of railway working, which proves conclusively, that the chances of accident are increased in direct proportion to the frequency of the changes made in the ordinary train arrangements. Yet it is upon the *ex parte* statements and crude recommendations of the gallant Captain and his co-laborateurs that the legislature warrants its mischievous interference with railway management, and upon which Mr. Cardwell founded his

proposed accidents bill, containing the most arbitrary and stringent clauses. We do not mean to contend that no cases of accident have occurred attributable to defective arrangements on the part of railway directors or their principal officers, but we do maintain that they are of so rare and exceptional a character as to form no sufficient grounds for parliamentary interference.

Signals.—One of the first conditions necessary to the safe working of a railway, is a good code of signals. All stations, and all junctions of one line with another, should be well protected by means of fixed signals. Of these the most efficient, in our opinion, is Stevens's

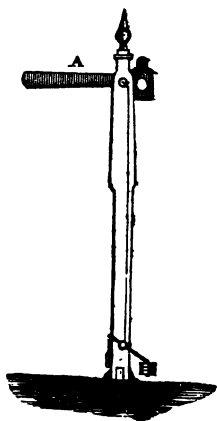


Fig. 1. Distant.

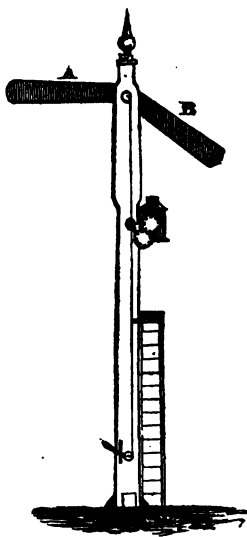


Fig. 2. Station.

Semaphore. It consists of one or two arms (according as it is a Distant, fig. 1, or a Station Signal, fig. 2.) attached

to the top of a lofty post. These arms are raised or lowered as occasion requires, by means of a lever ; and, in the case of distant signals, the communication is effected through the medium of a wire cord attached to the lever. When an arm is raised to a position at right angles to the post (as at A.) and to the line of railway, it indicates danger, and that no train must pass along the line protected by such arm. When it is lowered so as to form an angle of about 45 degrees with the horizon, as at B. it signifies *Caution*, and that any train passing is to do so at a very moderate speed, the engine-man having his train completely under control. When the line is quite clear the arms are allowed to fall within an opening, grooved for that purpose in the post ; it then indicates *all right*, and trains may then proceed past it at their ordinary speed. A lamp is attached to each post for the purpose of signalling at night, and is worked by the same agency as the semaphore-arms. This lamp can be made to exhibit either a red, green, or a white light, as may be required, which indicates respectively danger, caution, and safety ; a red light being shewn when the arm is in the position A ; a green light when the arm is lowered to B, and a white light when the arm is within the case. The semaphore signals are invariably made from the left-hand side of the signal post, as seen by the engine driver of any approaching train. The distant signals are worked with facility at distances of twelve to fourteen hundred yards from the place where the signal-man is stationed. The Great Northern Company have one worked at the distance of fifteen hundred yards. It must be obvious how important such an auxiliary signal is to the efficient protection of a station, giving, as it does, to coming trains, such timely notice of any obstruction. At junctions two semaphore-posts are usually placed and

connected with each other by an elevated platform, on which is fixed a box or hut for the pointsman. The signal apparatus is so constructed as to be readily worked with the feet by means of pedals, the hands being left free to work the switch rod for shifting the points. The junction signal is altogether a very complete and scientific apparatus, and admirably adapted to the purpose for which it is intended. The semaphore signals are in use on the London and North Western, Great Northern, Eastern Counties, and most of the leading lines; the length of railway upon which they are in operation being upwards of five thousand miles. Their great merit consists in their being easily manipulated, the simplicity of their construction, and consequent non-liability to get out of order, and in the distinctness of their signals, which it is almost impossible to mistake.



Fig. 8.

Figure 8, is another form of signal, which is in use on the North Eastern, and (with a few trifling modifications) on the North British and one or two other lines. It consists of an oblong board, painted red, and attached to a signal post. When turned to face an approaching train it indicates *danger*; and *all right* when turned to a position parallel with the line of railway. A lamp shewing a red and a white light effects this object at night. The Caution Signal is not given in this code.

The eccentric design of the Lancashire and Yorkshire signal (Figure 4,) appears to have been suggested by the overgrown spectacles which are sometimes seen over the doors of opticians. It consists of a pair of red discs



Fig. 4.

for signalling by day and a lamp for use at night. It is worked in precisely the same manner as the red board signal on the North Eastern Railway, and like it, only shews the signals of *danger* and *all right*. There are several modifications of these latter forms of signals in use on various lines, but none of them we consider can be advantageously compared with Stevens's Semaphore signal for certainty of action and impossibility of being confounded with other objects.

Whitworth's Releasing Apparatus.—An ingenious self-acting signal has been patented by Mr. C. H. Whitworth, of Halifax, for the purpose of exhibiting the danger signal immediately on the passing of a train. The signal wire is connected with a releasing apparatus, placed at a short distance from the signal post. A lever is placed, transversely, under the adjacent rail. To one end of this lever is attached a pedal, which occupies an angular position close to the inner side of the rail, its extreme end coming to within about half an inch of the level of the upper surface. The other end of the lever is connected with the releasing apparatus, which consists of a flat bar of iron, notched to receive a catch or tumbler. The *modus operandi* is simply this: When an engine passes, the flange of the tyre depresses the pedal, and, by suitable lever arrangements, raises the catch out of the notch in the horizontal bar, which is then free to move a limited distance. Motion is communicated by a balance weight in connection with the signal, which draws forward the wire to which the iron bar is attached, the instant the apparatus is released, and this forward motion turns on the danger signal without any manipulation on the

part of the pointsman. When a sufficient interval has elapsed, the signal-man draws back the wire by the usual means, the catch falls into the notch, and the signal is kept to the position of all right, until the apparatus is again released by a passing train, when the weight again draws forward the wire and iron bar, and turns on the signal to danger. A bell is sometimes used in connection with this apparatus, to warn the signal-man or the parties at the station, as the case may be, of the approach of the train. The invention has been in operation for some months on the North British, Lancashire, and Yorkshire, and some few other lines, and its working hitherto appears to have been satisfactory. There is little doubt but it will be found serviceable in many situations, especially where the signals are hidden from the view of the pointsman; and, if it will stand the test of winter working, it will prove a very useful auxiliary to the ordinary signals. It is necessary, however, to remark, *en passant*, that self-acting signals should only be used as aids to, and not as substitutes for, human vigilance.

It is unfortunate that one uniform code of signals has not been adopted on all the railways in this country. The expense of altering existing signals, or substituting for them others of a totally different description, now presents a serious obstacle to the attainment of the desired uniformity. Still it is very desirable that the various companies should agree upon some plan upon which all signals should in future be constructed, and all renewals made. They would thus, in the course of time, all become assimilated, and servants leaving the employment of one company for that of another, would no longer experience the inconvenience of having to deal with strange signals at each change of ser-

vice. We apprehend there would be little difficulty in working with two descriptions of signals on the same line, during the progress of replacement. Indeed this is practically done, in several instances, at the present time.

Railway Signal Lights.—Great attention has been paid of late years to the improvement of lights for railway signals. As in the majority of cases gas is not obtainable, and oil lamps require considerable attention, patent candles have been proposed as a substitute. The signals on about sixty miles of the Great Northern Railway, have been fitted up with Brydone's patent candle lamps. These have a great advantage over the oil lamps, inasmuch as they give a uniform and certain light, and require scarcely any attention, beyond renewing the candle from time to time.

Electric Light and Semaphore Signals.—It is, probably, to electricity that we must look for the perfection of railway signals. As the capabilities of this wonderful agent daily become more developed, the practicability of its application to railway signalling appears more evident. In fact this may now be considered to be merely a question of time. No doubt as science progresses, a simple and inexpensive mode of producing and sustaining powerful currents of electricity, and the means of maintaining the electric light at a uniform intensity, will be discovered. The only obstacles to its application to railway purposes will then have been removed. Dr. Watson (whose name is favourably known in connection with this subject) is of opinion that electric light signals could be plainly discerned through a fog upwards of a mile and a half, and that they could be seen through a clear atmosphere, three times that distance. The immense importance of their application to railways will therefore be seen at once.

Mr. W. S. Ward suggested, in a communication read before the members of the British Association at Hull in 1853—

“That a semaphore, consisting of a disc, might be constructed to make a partial revolution, so as to take different positions, exhibiting three distinct signals; and that its motion might be regulated by electro-magnets, worked by a continuous supplemental battery, of which the circuit is opened, closed, and changed by an electric-dynamic coil, which is moved by means of a current communication from a distant station, through a single wire. Thus what is mechanically effected at a distance of about half a mile, may by the proposed apparatus be effected at any required distance, and at any number of stations simultaneously.”*

Electric agency furnishes us with a light that rivals that of the sun, and a power that can be instantaneously transmitted to any distance. We cannot doubt that scientific research will, at no distant period, discover the means of rendering them unfailing and certain in their operation; and that electricity, like steam, will become the obedient servant of man, executing with unerring fidelity every task he requires it to perform.

Communication between Guard and Engine-driver.—The necessity of a means of communication between the guard and engine-man of every passenger train has recently been much insisted upon, and has nearly become the subject of legislative enactment. There is no question as to its desirability, but there are many difficulties in the way of its being conveniently and efficiently accomplished. A multitude of plans have been suggested, but of these only two have at present been brought into use on any considerable extent of railway. The first plan is that recommended by the Clearing House

* Practical Mechanics' Journal, Vol. 6.

managers, and consists simply of a single strike bell and cord. The bell is fixed to the tender near to where the engine-man usually stands. The cord is fastened to a ring at the end of a lever, and is conducted along the sides of the carriages to the guard's van, where the surplus length of cord (of which there must always be sufficient to allow for the expansion of the train) is wound round a wheel. A balance weight attached to the wheel keeps the cord "taut," at the same time allowing it to adapt itself to the varying length of the train. When the guard wishes to signal the engine-man, he turns the wheel rapidly, which has the effect of pulling back the lever attached to the bell end of the cord. A striking hammer is drawn back a limited distance with the lever, and then, being suddenly released, is forced, by a spring, sharply against the alarm bell. The bell, being about a foot in diameter, emits a powerful sound, and thus attracts the attention of the engine man. The opinions with reference to the efficiency of this signal are very conflicting. Some companies have considered its working satisfactory, and have applied it generally to their passenger trains; while others again, after several experimental trials, have condemned it as inoperative. From personal observation we are inclined to think that although it may work satisfactorily in some instances, still it is not such a signal as could, with safety, be implicitly relied upon.

Professor Glükman's Patent Electric Signal.—Professor Glükman has availed himself of electro galvanic agency to establish a communication between guard and engine-man. For this purpose he employs a battery (similar in principle to Daniel's constant battery) which is placed in the guard's van. An alarm bell is fixed in a suitable position upon the tender. The mode of action of this apparatus is thus

described by Captain Wynne in a report to the Board of Trade:—

“ Each carriage is furnished with its own wires of communication, which are coated with gutta percha, and enclosed in a wooden casing fastened underneath the carriage; each wire has a spiral spring in the centre, which allows it to adapt itself to the varying length of the draw bar, [train ?] the mode of coupling the wires of two adjoining carriages is simple and effective, and not subject to derangement. The mode of ringing the bell is by the application of a principle well known to electricians, but first applied, I believe, to this purpose by Professor Glükman. A bar of soft iron, in the form of a horse-shoe, is converted into a magnet, by having a stream of electricity passed round it; the armature of the magnet is the clapper of the bell, which is kept from the poles of the magnet of soft iron by means of a spring. Whenever connexion is made with the wires of the battery, the bar becomes a magnet, attracts the armature which strikes the bell, the action of which breaks the current and the spring forces back the armature, which returns the current, and the armature is again attached; and a series of rapid blows is kept up as long as the wires of the battery are connected, which is effected instantaneously by pressure, and continued without any exertion as long as the operator pleases.”

This mode of communication is in use on the passenger trains of the London and North Western Railway, and was also partially applied, for a short period, on the Great Northern Railway. It, however, apparently lies open to the grave objection of not being *invariably certain* in its operation; as we understand that out of a number of experiments which were made to test the certainty of its action, a large per centage were failures. It is probable that electricity will ultimately furnish us with the great desideratum of a perfect communication between the guard and engine-driver, but at present our means of manipulating and controlling

this subtle agent, appear too imperfect to accomplish that important object effectually.

Newall's Patent Railway Break.—The importance of an efficient break apparatus for the prevention of railway accidents can scarcely be over estimated. In the event of the engine-man or guard perceiving any obstacle on the line of railway, it is of vital consequence that he should be able to bring the train to a stand within the shortest practicable distance, so that a collision may be prevented, or its consequences rendered comparatively harmless by the speed of the train being greatly reduced. The breaks at present in general use are, confessedly, susceptible of great improvement; many ingenious modes of arresting the progress of trains have been suggested from time to time, but most of them have failed to stand the severe test of practical working. An exception must, however, be made in favour of the railway break invented by Mr. James Newall, and now in use on the passenger trains of the East Lancashire Railway. This break differs from the ordinary break in this important respect; it enables the guard to apply simultaneously every break in the train, and gives him an efficient means of communication with the driver. The construction of this break is as follows:—

“At one end of the break van or carriage there is a hollow cylinder, four feet in length and four inches diameter, which is fixed perpendicularly against the carriage. In this cylinder there is a spiral steel spring, which acts upon a circular cross piece, which rises when the spring is compressed and is driven downwards when the spring is allowed to expand. This cross piece is connected by rods with the long arm of the break lever; and its elevation or depression is followed by a similar movement of that part of the machinery. The cross piece is also connected with an upright rack which rises outside and above the cylinder, and upon which is exerted the power by

which the compression of the spring is affected. The rack is about three feet in length ; and is worked upon by the pinion of a wheel twenty-four inches in diameter, to which motion is communicated by a handle working another pinion. When the machinery is not in action, that is, when the spring working in the cylinder is allowed to expand, the cross piece is depressed, and, as this is followed by a similar depression of the long arm of the break lever, the breaks are applied. When it is desired that the break should be taken off, the break handle is turned, setting in motion the wheel and pinion which work upon the rack, elevating the cross-piece, and at the same time raising the break lever and compressing the spiral spring, which is thus ready at any moment, when this compression is removed, to apply the break. When the spring has been sufficiently compressed, a full catch is applied to the first pinion, and by this means the compression is maintained. A connection between all the breaks in a train, including that of the tender, is effected by means of tubular shafting which is carried either over or underneath the carriages. Provision is made by introducing ball and socket joints and slide sockets in the connections between each carriage, to cause the longitudinal shafting to accommodate itself to the expansion and contraction of the trains and the varying heights of the carriages. Should any portion of a train break away (which is sometimes the case) the breaks on the other portion will at once be applied, warning the engine-man of the circumstance. The engine-man as well as the guard has the power to apply all the breaks in the train simultaneously."

This break has now been in operation two years, and we believe has worked very satisfactorily. It does not appear, in practice, to be more liable to derangement than the ordinary break, over which it has many important advantages. A train fitted up with it can be brought to a stand within about one-third of the distance formerly required, and as the carriage wheels are not (except in cases of great emergency) completely locked, but allowed to revolve very slowly there is no tendency to wear flat places in the tyre, as is the case when the wheels *skid* along the rails. We understand,

that some of the carriages fitted up with this break have run upwards of 47,000 miles before the tyres required to be turned up. It would certainly appear that the merits of this break have been sufficiently proved to warrant its more extended application.

Miles's Hydrostatic Break.—This is an ingenious mode of adapting hydraulic power as a means of applying the ordinary breaks. The leading features of the invention are a flexible tube inserted into the engine boiler, and extending from thence to the extreme end of the train. Underneath each break carriage, and connected with the tube of which, in fact, it forms a continuous portion, is a cylinder, four or five inches in diameter, in which is fitted a steam tight piston, the rod of which is attached to the end of the break lever. When a communication is first opened between the boiler and the tube, the latter is immediately filled with water, and this water is acted upon by the same amount of pressure (usually 90 to 100 lbs. to the square inch,) as that in the boiler, the boiler and the tube being, practically, one. This pressure is communicated to the under surface of the pistons, upon which it acts with a force proportionate to their areas, so that if the transverse sectional area of each cylinder be 16 inches, and the pressure in the boiler 100 lbs., the force exerted upon each piston would be equal to 1600 lbs. The pistons are consequently forced upwards, raising with them the break levers and thus applying the breaks. When the communication between the boiler and tube is cut off, the pressure ceases, and the pistons are depressed to their original position by means of balance weights. The details of this invention exhibit considerable ingenuity. But there is one insuperable obstacle to the permanent adoption of water breaks in this

country, and that is their liability to be rendered inoperative in the winter season, in consequence of the water being converted into ice. It is frequently with the greatest difficulty that the engine pumps can be prevented from being completely frozen up while working during severe frosts; and the water in the tubes of the hydrostatic break would, under such circumstances, undoubtedly become one mass of ice. The same objection applies with still greater force to hydraulic couplings.

Coupling and Buffing Apparatus.—The insufficiency of the present methods of coupling and buffing railway rolling stock has caused a considerable proportion of the casualties on railways, from portions of trains breaking away, or getting uncoupled, or thrown off the rails. This remark applies more especially to goods trains, where several inches of play is necessarily allowed in the coupling links, and where the buffers, not being all placed in precisely the same line of direction, have a tendency to derail the waggons when the train is suddenly collapsed. Many attempts have been made to remedy these obvious defects, but none of them have, hitherto, been very successful.

A novel mode of coupling railway carriages and waggons has been recently introduced by Messrs. Taylor and Cranstoun, on the Morayshire Railway. Its general features are described as follows :—

“ Each carriage or waggon, in addition to draw hooks, has attached to it three parallel-jointed engaging chain-links freely hinged, so as to be capable of being raised or lowered at pleasure. These links are made with a central back stop-joint, in such manner, that whilst they will act with all necessary flexibility when drawing or being shifted in certain directions, yet, when lifted by the elevating lever, they will rise in a rigid condition, as if solid. A transverse coupling

or elevating shaft is disposed in bearings beneath each set of links—this shaft having upon it a lever frame piece, with stud projections thereon, for the purpose of giving the lift to the links. Each end of the shaft carries a hand lever conveniently disposed for the hand of the attendant, so that when passing along the train he can quickly lift or lower the links, holding pins being provided for setting the levers at the required point. When the waggons are to be coupled the attendant passes along either side of the train and removes the holding pin; the links then drop and the necessary engagement is thus instantly effected. When the waggons are to be uncoupled, the attendant lifts the links clear off the hooks, by simply pressing down the hand lever, and either allows the links to drop to a vertical position when the waggon is removed, or, by inserting the holding pin, the links are fixed in a position for coupling when the waggons are brought together. Carriages are coupled or uncoupled in the same manner as the waggons, with the exception that the centre or draw-link requires to be tightened up, after the carriages are coupled, to bring them closely together, and slackened off sufficiently when they are to be uncoupled. To effect this a transverse hand wheel shaft is fitted upon the carriage frame; the centre of this shaft having upon it a worm gearing with a worm wheel set in a longitudinal nut link of the draw hook spindle. Hence by turning one or the other of the hand-wheels, the draw-link is tightened or slackened as required.”*

The chief objections to this coupling are the complexity of its construction and its consequent high cost. The tendency of all inventions relating to railway plant, should be to simplify and reduce the number of the working parts, both on grounds of economy and safety.

Chattaway's Patent Buffing and Coupling Apparatus.—The peculiarity of this invention consists in combining the buffer and draw hook, and buffing in the centre instead of the corners. To effect this the draw rod is strengthened to about $2\frac{1}{4}$ inches, and the hook is made of the peculiar form shewn in the engraving, so as to serve for the double pur-

* Practical Mechanics' Journal, Vol. 8, p. 30.

pose of buffing and drawing. Fig. 5 is a side, and fig. 6 a front, elevation of the apparatus. A portion of the draw rod is screwed, as at A. and is fitted with an adjusting nut and

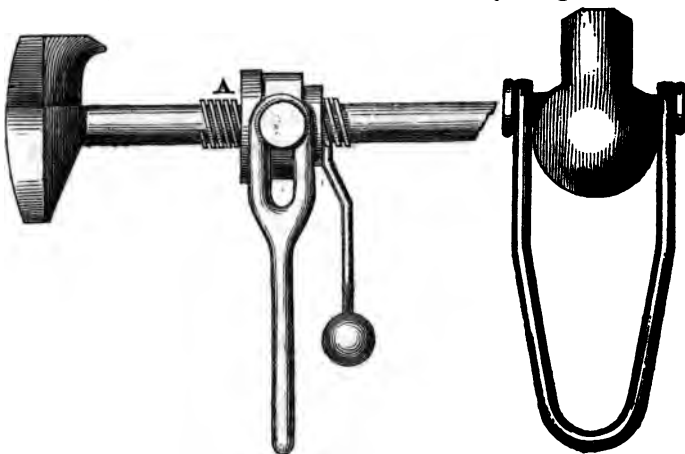


Fig. 5.

Fig. 6.

collar apparatus, with projecting arms carrying the coupling links. This arrangement allows the coupling to be tightened up, or slackened off, as occasion may require. By this method separate corner buffers and side chains are dispensed with, the buffing, drawing, and coupling apparatus being all combined upon one central rod. As the couplings are drawn perfectly tight, it is impossible for them to get off the draw hook, nor is there any liability to break from sudden jerking, as is the case with the ordinary couplings. To connect or disconnect is but the work of a moment. This contrivance affords far greater security and efficiency, at considerably less cost, than any other method. There is no question as to the decided superiority of centre buffing; the invention now described will materially facilitate the

application of this principle, as stock fitted up with it can be conveniently run amongst carriages or waggons buffed in the ordinary way.

The Electric Telegraph offers great facilities for the safe working of railway traffic; and it is very desirable that it should be used as generally as possible for that purpose. Every railway company should have a set of telegraph wires for the especial object of working the line. All trains should be telegraphed from station to station when practicable. There should be no hap-hazard working, but the whereabouts of every train should be known throughout the whole of its journey. This method has been in operation for some years on the South Eastern Railway, and partially, on several other lines, with the most satisfactory results. The advantages it presents are so obvious, and its application so free from difficulty, that it is needless to enlarge upon the matter.

We dismiss this portion of our subject with the observation, that no contrivance however ingenious, no arrangements however perfect, can avail to prevent accidents, unless railway servants exercise habitual vigilance and caution. This fact cannot be too strongly enforced upon their attention. With an efficient code of signals, well matured regulations, and intelligent, well trained, and adequately paid officers, railway accidents would soon happily become of rare occurrence.

CHAPTER IV.

BEFORE concluding this volume, it may be interesting to our readers if we give a few statistics of the traffic working, on railways in the United Kingdom, in the year 1854; and also take a brief glance at the operations on some of the principal lines in America during the same period.

England and Wales.—During the year alluded to, 92,346,149 passengers were conveyed, on the railways in England and Wales, 1,379,249,238 miles, producing a revenue of £7,896,502. The Receipts for the conveyance of Horses, Carriages, Dogs, Parcels and Mails, were £879,257; and for carriage of Goods, Minerals and Cattle, £8,567,264; the aggregate Receipts being £17,343,023.

The gross receipts per mile of railway, were :—

	£
From passengers	1324
„ Horses, Carriages, Parcels, Mails, &c.....	149
„ Goods, Minerals and Cattle	1439
Total per Mile.....	<u>£2,912</u>

The proportions of the receipts from the several descriptions of traffic, to the gross receipts, were as follows :—

	Per Cent.
Passengers	45·53
Horses, Carriages, Parcels, Mails, &c.	5·07
Goods, Minerals and Cattle	49·40
	<u>100·00</u>

The average sum received from each passenger was 25·05d.

Ditto	receipts from Passenger Trains	5s. 9d. per train mile.
Ditto	ditto	Goods ditto 6s. 0d. ditto.
Ditto	ditto from each Passenger Train	£8 1s. 8d.
Ditto	ditto ditto	Goods ditto £15 11s. 7d.
Ditto	mileage of Passenger Trains	28·1 miles.
Ditto	ditto	Goods ditto 52·0 ditto.
Ditto	number of Passengers per train	85.
Ditto	ditto	miles travelled by each Passenger, 15 (nearly)

Scotland.—Number of passengers 11,949,388, conveyed 146,244,120 miles, producing £756,870. Receipts for conveyance of Horses, Carriages, Parcels, Mails, &c. £93,791, and for carriage of Goods, Minerals and Cattle, £1,147,656; the total Receipts being £1,998,317.

The total receipts per mile, for the year, were:—

From Passengers	£ 757
„ Horses, Carriages, Parcels, Mails, &c.	94
„ Goods, Minerals, and Cattle.....	1148
Total per Mile	<u>£1,999</u>

The proportions of the amounts received from the several descriptions of traffic to the gross receipts, were as under:—

	Per Cent.
Passengers	37·87
Horses, Carriages, Parcels, Mails, &c.....	4·70
Goods, Minerals, and Cattle.....	57·43
	<u>100·00</u>

The average sum received from each Passenger, was 15·20d.

Ditto	receipts from Passenger Trains	5s. 0d. per train mile.
Ditto	ditto	Goods ditto 7s. 0d. ditto
Ditto	ditto from each Passenger Train,	£6 14s. 0d.
Ditto	ditto ditto	Goods ditto £13 10s. 4d.
Ditto	mileage of Passenger Trains,	27 miles (nearly).
Ditto	ditto	Goods ditto 38½ ditto
Ditto	number of Passengers per Train	94.
Ditto	miles travelled by each Passenger	12·2.

Ireland.—Number of passengers 6,911,170, conveyed 96,555,135, miles, producing £521,637. Receipts for conveyance of Horses, Carriages, Parcels, Mails, &c. £96,956; and for carriages of Goods, Minerals, and Cattle, £255,847; the gross traffic amounting to £874,440.

The receipts per mile of railway, were:—

	£
From Passengers	614
„ Horses, Carriages, Parcels, Mails, &c.....	114
„ Goods, Minerals, and Cattle	301
Total Receipts per Mile for the year...	<u>£1029</u>

The proportions of the amounts, received from the several descriptions of traffic, to the total receipts were as follows:—

	Per Cent.
Passengers	59·66
Horses, Carriages, Mails, Parcels, &c.	11·08
Goods, Minerals, and Cattle	29·26
	<u>100·00</u>

The average sum received from each passenger was 18·12d.

Ditto receipts from Passenger Trains 4s. 8d. per train mile.

Ditto ditto Goods ditto 7s. 2½d. ditto

Ditto ditto from each Passenger Train £7 5s. 9d.

Ditto ditto ditto Goods ditto £20 7s. 9d.

Ditto mileage of Passenger Trains 30·3 miles.

Ditto ditto Goods ditto 57·8

Ditto number of Passengers per Train, 81·4

Ditto miles travelled by each passenger 14·0.

United Kingdom.—The total number of passengers in the United Kingdom, was 111,206,707, conveyed 1,622,048,490 miles, producing a revenue of £9,175,009. The receipts for the conveyance of Horses, Carriages, Mails,

Parcels and Dogs, were £1,090,004 ; and for the carriage of Goods, Minerals and Cattle, £9,970,767. The aggregate amount of Traffic being £20,215,780.

The receipts per mile of railway, were :—

	£.
From Passengers.....	1,169
„ Horses, Carriages, Parcels, Mails, and Dogs...	136
„ Goods, Minerals, and Cattle.....	1,271
Total Receipts per Mile for the year.....	<u>£2,576</u>

The proportions of the several descriptions of traffic to each other being :—

	Per Cent.
Passengers	45·38
Horses, Carriages, &c.....	5·28
Goods, Minerals and Cattle.....	49·54
	<u>100·00</u>

The average sum received from each Passenger was 19·80d.

Ditto ditto ditto ditto per mile (all classes) 1·36d.

Ditto receipts from Passenger Trains 6s. 1d. per train mile.

Ditto ditto Goods ditto 6s. 6½d.

Ditto ditto from each Passenger Train £8 11s. 0d.

Ditto ditto ditto Goods ditto £16 14s. 0d.

Ditto mileage of Passenger Trains 28·13 miles.

Ditto ditto Goods ditto 51·23 ditto.

Ditto number of Passengers per train 92·89

Ditto ditto miles travelled by each Passenger 14·54.

The average number of passengers conveyed daily was 304,676.

Ditto daily receipts £55,386

American Railways.—From a very able and elaborate report made by the state surveyor, on the railroad statistics of the state of New York, for the year ending September, 1854, we gather the following information regarding the working of some of the principal lines in America.

The average cost of maintenance of permanent way and stations, on 2,229 miles of railroad, was £241 per mile, the greater portion being single line.

The average cost of construction, (including working plant) on 2341 miles of railway, single and double, was £10,591 per mile.

The average cost of construction of railways, having only a single line, appears to be as follows :—

	£
Permanent Way and Bridges	4,851
Stations, Workshops, and Engine houses	380
Land and Fences	688
Engineering and Agencies	246
Rolling Stock.....	1,283
Total per Mile.....	<u>£7,448</u>

And the average cost per mile of upwards of 2000 miles of mixed railway (double and single) was as under :—

	£
Permanent Way and Bridges.....	6,535
Stations, Workshops, and Engine House...	509
Land and Fences	921
Engineering and Agencies	235
Rolling Stock	1,283
Total cost per Mile.....	<u>£9,483</u>

These are very low sums per mile as compared with the average cost of railways in this country ; but our transatlantic brethren have not had to pay such exorbitant sums for land and compensation as have obtained here ; and they have executed the works with the strictest regard to economy.

Turning from cost of construction to the expenses of conducting the traffic, we find the average working expenses per train mile, to be as follows :—

	D.
Maintenance of Way	11·65
Repairs of Engines and Carriages.....	9·02
Wages to Enginemen and Firemen.....	2·81
Fuel and Cleaning	7·44
Oil and Waste for Engines.....	0·94
Ditto Carriages and Waggon.....	0·71
Compensation	0·96
General Expenses	10·11
Contingencies	4·21
General superintendence.....	0·67
Total Cost per train Mile...	<u>48·52</u>

This result is high, as contrasted with British lines, being in fact more than double. After making due allowance for the difference of circumstances under which the railways in the two countries are worked, it is evident that, with regard to economical working, the advantage is with the railways of the old world.

The total receipts per mile for the year, on 2189 miles of road were:—

	Per Mile
	£
Passengers	875
Goods	809
Sundries	92
Total	<u>1776</u>

Or £800 less than the average receipts per mile on the lines in the United Kingdom.

The proportions of the amounts received from the several descriptions of traffic, to the gross receipts were:—

	Per Cent.
Passenger Traffic.....	49·21
Goods ditto	45·63
Sundries	5·16
	<u>100·00</u>

The average receipts from Passenger Trains were, 5s.8d. per train mile.

Ditto ditto Goods ditto 8s.7d. ditto

Ditto ditto each Passenger, per mile, 1'0d.

Ditto ditto Goods, per ton, per mile, 1'44d.

Ditto number of miles travelled by each passenger was 39.

Ditto First class fare 1'4 per mile.

Average speed of ordinary trains 22'3 miles an hour *inclusive*, and 28'25 miles *exclusive*, of stoppages.

Average speed of express trains 29'25 miles *inclusive*, and 35 miles an hour *exclusive*, of stoppages.

Average weight of passenger trains, exclusive of load, 67 tons.

Average speed of goods trains 12'15 miles an hour *inclusive*, and 15'5 miles an hour *exclusive*, of stoppages. Average weight, exclusive of load, 140'7 tons.

The following statistics of the working of the New York and Erie Railway, for the year ending September, 1854, will serve for comparison with those previously given of the leading lines in this country.

NEW YORK AND ERIE RAILWAY.

Length of double line, 262 miles; single ditto, 183 miles; total length of line, 445 miles.

Cost £7,175,844 = £16,125 per mile.

GENERAL EXPENDITURE.

£		Per Train Mile. D.	Per Centage D. to Receipts.
129,353	{ Maintenance of way \$291 per mile, per annum	—	10'476 11'25
47,960	... Wages to Enginemen & Firemen	3'884	
87,897	... Fuel	7'118	
11,601	... Oil and Waste	0'940	
1,262	... Wood and Water Stations	0'102	
		—————	12'044 12'93
72,731	... Repairs to Engines and Tenders	.....	5'890 6'32
47,566	... Ditto Carriages and Waggon	.....	3'852 4'14
398,370	... Carried forward.....	.....	32'262 34'64

COST OF CONSTRUCTION.

129

£		Per Train D.	Mile. D.	Per Centage to Receipts.
398,370	Brought forward.....		32·262	34·64
22,480	{ General Superintendence, Office Charges, and Stationery..... }	.....	1·821	1·96
24,754	... Wages to Clerks and Agents...	.....	2·005	2·15
55,462	{ Ditto Porters, Switchmen, Conductors, and Breaksmen }	.....	4·492	4·82
27,232	{ Expenses loading and unloading Goods .....	.....	2·205	2·37
7,186	{ Oil and Waste for Carriages and Waggon's .....	.....	0·582	0·62
10,577	... Compensation ..	.....	0·857	0·92
19,949	... Contingencies .....	.....	1·683	1·73
22,534	... Sundry Charges not specified...	.....	1·825	1·96
<u>588,544</u>	..... Total		<u>47·732</u>	<u>51·17</u>

Mileage—Passenger Trains, 1,496,661 miles; Goods ditto
1,466,823 miles; Total, 2,963,484 miles.

RECEIPTS.

	£	Per Centage to Gross Receipts.
Passengers, 1,125,124	374,116 ...	32·52
Goods, 663,612 tons	723,088 ...	62·89
Sundries	53,002 ...	4·59
Total	<u>1,150,206</u>	<u>100·00</u>

Total Receipts, per mile, per annum, £2584·7

Ditto Expenses ditto 1322·6

Average Receipts, per mile, weekly 49·7

Ditto Expenses ditto 25·4

Average rate of interest on Loans, 7 per cent.

Dividend per annum, 7 per cent.

These figures are very significant. The working expenses of this line are upwards of 51 per cent, and its loan capital bears the high rate of interest of 7 per cent., while the receipts are £328 per mile, per annum, less than the

average receipts of the lines in England and Wales; yet, after defraying its onerous obligations, it is enabled to pay its shareholders the liberal dividend of 7 per cent. annually. This railway owes its favourable position solely to its having been constructed at a moderate outlay. It might, in fact, pay 5 per cent. upon its share capital, and with the balance of its profits form a reserve fund, which, in the course of twenty years, would amount to a sum sufficient to reconstruct the whole line of railway in the most substantial manner. The result would have been very different had its cost been equivalent to that of the principal English lines. The great error into which most of our engineers have fallen has been to rush at once into a profuse expenditure, constructing their works and stations on the most ample and expensive scale, instead of strictly limiting themselves, in the first instance, to the construction of such works as were clearly necessary for the traffic in the early stages of its development, and gradually extending them as the increasing traffic demanded enlarged accommodation. This latter course of procedure, in reference to railway operations, was strongly advocated so long ago as 1843, in a work entitled "Ensamples of Railway Making."* If the views therein urged had been timely acted upon, the railway expenditure in this country would have been lessened by many millions; these magnificent undertakings (for they truly are so) would then have proved remunerative. It may now be laid down as a general axiom that no railway which may in future be constructed will pay for the outlay if its cost approximate to the old standard of £30,000 and upwards per mile; and it may be considered as equally certain, that any line, the cost of which is

* *Ensamples of Railway Making.* John Weale, London, 1843.

limited to £10,000 or £12,000 a mile, will indubitably afford a good return to its shareholders, however thinly populated and unpromising may be the district through which it runs. It is important that these facts should be borne in mind in judging of the expediency of any prospective railway extensions. It is essential to our commercial prosperity and our pre-eminence as a nation, that none of the sources of wealth with which a beneficent Providence has so freely gifted this favoured country, should remain undeveloped; not a mine nor quarry of importance, not a single agricultural district, should be allowed to remain without the advantages of railway communication. It is quite possible to effect this, and in such a manner as to ensure an adequate return upon the capital employed, but it is to be effected only by the hearty cooperation of all parties interested in the matter, whether as landowners, occupiers, or shareholders, and by the exercise of a rigid but sound economy in the formation of the works. Some few lines have lately been constructed under these conditions with the most signal success.

With reference to the old lines, those pioneers of our railway system, by whose dearly purchased experience we have been so slow to profit, there is hope for them yet. Although they can now never attain the high financial position they might have held as the best and safest of all investments, had their affairs always been conducted with prudence, sagacity, and integrity, still there is no reason to doubt that they will henceforth gradually, but steadily, improve. Inventive genius and mechanical skill, which are constantly economising the cost of production of all the staple articles of manufacture in this country, will yet accomplish much for railways. Improvements in the con-

struction of permanent way and rolling stock ; expedients for lessening the immense wear and tear, which are the result of carrying heavy loads at high velocities ; improved means of generating and applying steam power ; and possibly the the substitution, ultimately, of some more economical, but equally powerful agent ;—will all tend to lessen the heavy working charges which now press so severely upon railway resources. Further than this we may reasonably expect that by the aid of accumulated experience, railway working will virtually become a science ; that greater immunity from accident will be obtained, consequent upon more perfect arrangement ; and that by placing at the head of departments men of known ability and enlarged views,—men who possess the art of conducting in the readiest manner and to the greatest advantage, the vast amount of traffic which railways have developed, these important undertakings will eventually be raised from their present state of extreme depression.

It forms no part of the plan of this work to detail the advantages which have resulted from the introduction of railways into this country, they are patent to all, though appreciated to their full extent by so few. The majority of men, unfortunately, prefer to animadvert upon the short comings of the railway system, and to record against it their severest judgment, because it is leavened with the imperfections which enter, more or less, into all human arrangements, rather than dwell upon the manifold benefits which have characterised its progress. The iron road,—associated as it is with the steam ship and the electric telegraph,—is destined to become one of the most powerful agents of civilisation the world has hitherto seen. Not only are these agents daily bringing into more intimate con-

nection the people of the same empire, dissipating local prejudices, and placing within the reach of the humblest, comforts and conveniences which formerly only fell to the lot of the privileged few, or were indigenous only to favored spots,—but they are gradually drawing together in amity the whole family of man, encircling the world with their Ariel-like girdle, and intersecting it in every direction with the highways of civilization. They are leading nations to an honourable rivalry with each other in the arts which ennoble and the sciences which bless mankind ; they are giving, even to those whose profession is war, an interest in the maintenance of peace. Through the backwoods and vast prairies of America,—across the arid sands of Egyptian deserts,—through the thick jungles of India,—over wildernesses where, before, the foot of man never trod,—in glades his vision never penetrated, and wild secluded spots which have remained undisturbed by mortal presence since the dawn of creation,—is already heard the shrill whistle of the steam engine, proclaiming the triumphs of human progress and the advent of peace. And still are railways extending their iron arms, under the guidance of men whose indomitable energies suffer them to be deterred by no difficulty, daunted by no danger,—men who, in the prosecution of their objects, have constructed works before which the seven wonders of the ancient world fade into insignificance. For these reasons, and many others which might be adduced, we cannot more appropriately close this volume than by wishing them and their undertakings—GOD SPEED.

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